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Country Environment Profile of Maldives

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INDEX P.

ABBREVIATIONS

DER	Department of External Resources
DoM	Department of Meteorology
EEZ	Exclusive Economic Zone
EPPA	Environmental Protection and Preservation Act
ERC	Environment Research Centre
ESCAP	Economic and Social Commission for Asia and the Pacific
GCRMN	Global Coral Reef Monitoring Network
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gas
GNP	Gross National Product
ICRI	International Coral Reef Initiative
IMO	International Maritime Organisation
INDOEX	Indian Ocean Experiment
IPCC	Intergovernmental Panel of Climate Change
IRRM	Integrated Reef Resources Management
JICA	Japan International Cooperation Agency
JICS	Japan International Cooperation Systems
MAGICC	Model for the Assessment of Greenhouse Gas Induced Climate Change
MCPW	Ministry of Construction and Public Works
MCST	Ministry of Communication, Science and Technology
MEWE	Ministry of Environment, Water and Energy
MHAHE	Ministry of Home Affairs, Housing and Environment
MHREL	Ministry of Human Resources, Employment and Labour
MHUDB	Maldives Housing and Urban Development Board
MMA	Maldives Monetary Authority
MMR	Maternal Mortality Rate
MOAA	Ministry of Atolls Administration
MOE	Ministry of Education
MOFAMR	Ministry of Fisheries, Agriculture and Marine Resources
MOFT	Ministry of Finance and Treasury
MOH	Ministry of Health
MOT	Ministry of Tourism
MOTCA	Ministry of Transport and Civil Aviation
MOTI	Ministry of Trade and Industries
MPND	Ministry of Planning and National Development
MRC	Marine Research Centre
MWSA	Maldives Water and Sanitation Authority
MWSC	Male' Water and Sewerage Company
NAPA	National Adaptation Plan of Action
NCPE	National Commission for the Protection of Environment
NCSA	National Capacity Self-Assessment
NDP	National Development Plan
NEAP (II)	Second National Environment Action Plan
NGO	Non-Governmental Organisation
Rf	Rufiyaa
TNA	Technology Needs Assessment
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
V&A	Vulnerability and Adaptation
WHO	World Health Organisation

1. SUMMARY

The tropical island environment and the marine biological diversity of the Maldives have proved to be unique marketable assets, in a country, which is devoid of any other commercially exploitable resources. Therefore habitat destruction and over-exploitation are some of the major threats to its biological diversity. In addition, effects of global warming are a major concern because of its adverse impact on the coral reefs. The country is no exception to the global problem of loss of biodiversity. Marine biodiversity is threatened by coastal development activities, including harbour development, land reclamation and coastal protection, increased demand of natural resources due to population expansion and rapid economic development. Land clearance for housing endangers the sparse terrestrial biodiversity of many islands particularly the densely populated islands as nearly 300,000 inhabitants have to share 300 square km of islands. As the emission of greenhouse gas will increase by 65 % over the next 25 years[1] with dramatic consequences on climate change, increase in sea temperature due to climate change is already a major threat to the coral reefs of Maldives

Maldives' population and economy have to take into serious consideration threats such as global warming and sea level rise caused by activities elsewhere that will subject Maldives to frequent natural disasters and erode its unique natural advantages currently enjoyed by the country in the long run. The recent tsunami has severely affected the inhabited islands mainly with regard to local population livelihoods. Moreover revenues from tourism have severely decreased for several consecutive months. Such a degree of vulnerability, associated with low level of economic diversification, means that structurally the Maldives will still face several economical and environmental challenges.

The economic foundation of the country is very narrow, as well as its human resources are developed insufficiently to sustain a dynamic, knowledge-based economy. Fisheries producers are exposed to periodic constraints of earning linked to external price fluctuations. Tourism sector is vulnerable to a number of natural and manmade threats. A decline in either the tourism or the fisheries industry could have a serious impact on the cost and the standard of living, development activities, provision of public services, level of domestic economic activity and employment in the Maldives. The underemployment level is high as people are poorly trained for medium level jobs. There is a general lack of qualified personnel in various sectors of the economy. The expansion of secondary school curricula to include more studies on the specific environmental issues of the Maldives should be undertaken as well as research to establish sound foundations for environmental education should be fostered. Special efforts should be undertaken to enhance environmental education in the training of the teachers. Qualified Maldivian personnel is particularly reluctant to accept jobs in remote islands. There is still a lack of associating the population to the benefits of the tourism sector.

There is malnutrition still present in many inhabited islands due to a lack of a diversified alimentation. Poverty level is still severe as 42 % of the population still leaves with 1 Euro/day, mostly in remote areas. Many inhabitants of isolated islands do not have access to hospitals and basic social services. Unsafe waste disposals and non-adapted sewerage systems represent a continuous threat for the health of the population. Transport represents 40% of any governmental projects high cost. The country is highly dependent on fossil energy as alternative energy sources are poorly developed. Many environmental recommendations for guidelines have been proposed by the MEC in several

[1] G8 summit, United Kingdom, July 2005

sectors. Despite the fact that the country has also joint a number of international environmental agreements, there is still a great need of regulation enforcement, monitoring and inspection capacity.

The tsunami of 26 December 2004 was the country's greatest natural disaster ever. When loss of life, fortunately low, physical damage on many islands was great. A curtailment of peak-season tourism means that growth will plummet in 2005, but should rebound in 2006 as the tourist facilities themselves are largely intact. However, substantial aid will be required for the reconstruction of infrastructure necessary to sustain the past high-growth path that had reduced poverty in previous years. The tsunami has set back the high levels of social progress and prosperity achieved in recent years. Severe damage was caused to houses, tourist resorts, boats and other fishing equipment, schools, health facilities, transport and communication equipment, water and sanitation, and electricity infrastructure. There is high environmental damage and substantial soil erosion on many affected islands which to great extent rely on agriculture and home based market gardening for their livelihoods.

The transition of the physical damage into an economic shock occurred to a large extent through contraction of the tourism and fisheries sectors, which sustained the largest losses. Lost tourism and fisheries income cause the reduction of GDP growth, employment, and government revenues. The revival of the Maldivian economy depends critically on how rapidly the two leading sectors, tourism and fisheries, recover. Proper environmental management is more than ever a sensitive issue for the sustainable economic growth. Public financing for the reconstruction of lost or damaged assets and infrastructure, and for temporary income support to the affected, should take into a close consideration a lot of physical / biological / human / social / economical factors linked to environment issues: sea level rise, tsunami risks, fresh water supply, sustainable solid waste and sewerage management, adapted energy supply.

The recent disaster has yet again underlined the critical importance of providing environmentally safe zones for isolated communities living in distant islands that are largely exposed to the dangers of wave action, erosion and flooding. Meanwhile the strategy to regroup population is not sufficient to create the framework of sustainable development. The GoM promotes the Safe Island Policy to develop measures to mitigate ecological disasters and enable the communities to sustain social and economical development. In terms of impacts on the Government's long-term development strategy, the tsunami has reinforced the established policy of encouraging voluntary population movements to the less vulnerable islands, which has now assumed even greater urgency than in the past. This policy aims to mitigate the risks of future tsunamis and rising sea levels, help realise economies of scale in the strengthening of public and private services, improve welfare, and help retain the population in the selected safe islands.

Conclusions

While the Maldives economy is highly dependant on 2 sectors directly linked to natural resources, the country faces a lack of natural resources to improve the welfare of its population. Many of the communities among the 200 inhabited islands are subjected to extreme hardships and vulnerability, because of high population density or environmental problems such as land erosion, desertification and fresh water depletion. Food products (except fish), fossil energy and construction materials such as wood have to be imported. Inadequate access to good quality health care and education also contributes to the poverty in the Maldives, particularly in the Atolls. Poverty is also further aggravated by lack of access to adequate transport and communication services, drinking water, electricity and essential consumer goods

Though possible adaptation strategies to climate change are identified, the country lacks the capacity to adapt both financially and technically. Human resources capacity building in all major sectors is identified as a critical component in order to successfully respond to the impacts of climate change.

In education, the overall learning achievement among primary students is very low and a significant gap exists between Male' and the Atolls population. Secondary terminal examinations also show poor results. The low quality of education is the result of 40 percent of the teachers being untrained, lack of teaching/learning facilities and lack of an adequate national system to manage, monitor and supervise education process.

The ever-increasing consumption of imported fuel for electricity generation and in sectors such as fisheries, tourism, and transport is an issue of concern. Although the country' equatorial exposure to sunlight would seem to make the country especially conducible to solar power, this clean, renewable and abundant source has scarcely been tapped to date.

In the tourism sector, there is a lack of prospect of alternatives for higher financial return to the population.

In order to reduce the concentration of economic opportunities in Male' and to ensure a broader based equitable development, the GOM promotes the regional development process including economic development, provision of health care services, education and infrastructure. Regional development is designed with the principle of sustainable development and aimed at promoting, expanding and strengthening of economic diversification. A Regional Development Management Office (RDMO) will be set up in any of the 5 regions defined as North/North Centre/Centre/South Centre/South. Actually only 2 offices are operational while facing deficiency of management capacity.

The Safe Island Policy promotes the concentration of dispersed population on safer islands. Many investments need to be realised in order to help settle the newcomers: construction of schools, hospitals, housing, sea shelter, drainage zone, desalination plants, airport and development of income generating activities. This programme shows clear challenges of promoting environmentally friendly activities such as alternative energy sources, sustainable solid waste and sewerage systems, coastal management….Meanwhile land reclamation could lead to severe environmental damages and risks to the population due to the loss of natural barriers such as coastal reefs and mangroves.

Recommendations

The following recommendations are related to possible EC projects for the CSP period 2007-2013 according to its priority to support the Safe Island Policy.

As the Maldives is one of the world countries facing the highest environmental stress, livelihood development through the sustainable management of its natural resources will provide its population with new types of income generating activities and also train them to live in a closer positive relations with the environment. Environment should be regarded more as a vulnerable friend rather than a menacing enemy. Safe islands are considered as growth centres. Environment should be more related to creation of employment as most of the state revenue depends on the sustainable management of natural resources. There should be promotion of resort development involving a higher financial return for the Maldivian population. Environment friendly activities should be prioritised in the Safe islands such as smoked tuna factories, clean energy production, solar desalinisation plants, organic agriculture, raw fish and bioethical restaurants… It should be necessary to increase the envi-

ronmental standards for any human related activities that could have a negative environmental impact. The standard ISO 14001 should be adopted as much as possible.

The secondary curriculum needs to be diversified to meet the needs of the growing number of secondary students and to make learning more relevant to social and economic needs. Emphasis has to be made on expanding higher education opportunities, facilitating private sector participation in education, and increasing the number of local secondary school teachers. Establishment of good governance is also needed through community-based system for sustainable management of marine resources and promoting sustainable use of fish resources at the grassroots level through formal, non-formal, and adult education system. Apart from a general need of qualified medical personnel, training in public health issues is also necessary since it is closely linked to the environmental concerns.

In the Safe Islands, it is recommended to adopt a communal sewerage system rather than individual ones. The burning of garbage with a co-generation system has the advantage of producing electricity and reducing the volume of garbage. Alternative sources of renewable energy have to be tapped to reduce the dependence on imported fuel. Measures need to be taken to introduce alternative sources of energy. Any process of land reclamation should consider the risk for its population facing the loss of natural protecting zones as coral reefs and mangroves.

It is recommended to support the decentralised process of regional management with capacity building and training courses. This support should help the RDMOs in defining the best development strategies in poverty alleviation and regional development. The EC Safe Island support programme to Muli and Kudahuvadhoo should be realised through the strengthening of the RDMO of the South Centre region.

2. STATE OF THE ENVIRONMENT

2.1. BACKGROUND INFORMATION

2.1.1. Bio-physical

The Republic of Maldives is an island nation in the Indian Ocean southwest of India. It comprises of about 1.200 islands in 26 atolls. However, only some 200 of these islands are inhabited. The country is an 860 km long chain of coral atolls that stretches longitudinally in a double chain of islands. The width of the chain varies from 80 to 120 km at some locations. The total land area of the Maldives is estimated at around 300 km2. The maritime area of the Exclusive Economic Zone (EEZ) amounts to more than 859, 000 km^2.

The environment of the Maldives is extremely fragile and vulnerable to a number of domestic and external threats. The coastal settings of the Maldives make it vulnerable to natural disasters associated with sea level rise and the changes in the temperatures and rainfall patterns. Climate change will also affect the social and economic development of the country, as most of the economic activities are heavily dependent on the coastal ecosystem. In addition, the entire population and the infrastructure of Maldives are very close to mean sea level. It is anticipated that climate change will have negative effects on the economy and the Maldivian society; the society will be more prone to multiple stresses. The main concern for the Maldives will be sea level rise that will lead to, or exacerbate, land loss from beach erosion and inundation and damage human settlements and vital infrastructure. Maldives will also be very vulnerable to impacts of rising air and sea surface temperatures and changes in rainfall patterns.

Consequently, environment protection is one of the top priorities of the Government. Global environmental issues, such as global warming and climate change, are serious threats to the very survival of the Maldives. The recent tsunami is a wake up call for prevention of climate change and sea level rise impacts.

The Maldives was one of the worst affected among the countries hit by the tsunami. While only about 100 people died, (a small figure compared to the more than 260,000 killed by the tsunami worldwide), the country and its economy lay in ruins and many people have been displaced to safer islands. Infrastructure was destroyed by the oncoming waves. Total damage is estimated to be in the area of US$ 470 million – just over 62 percent of GDP. Almost all islands were affected by severe floods. Preliminary reporting indicates that more than 34 percent of inhabited islands were completely flooded, while more than 26 percent of inhabited islands were one third flooded. More than 90 percent of infrastructure and belongings were destroyed in severely affected islands. People from more than 18 islands had to be temporarily moved to other islands. Agriculture, fisheries, and basic livelihoods were washed away. Vital infrastructure such as wharves, fish processing facilities, hospitals and schools disappeared entirely. The most vulnerable and poorest groups of the population now face the spectre of an even more precarious future. The Maldivian population will have to pay heavy cost in the next coming years. Moreover, the government has to face a high cost of investment for protection against climate change and overall warming. The physical and economical survival of the country is closely related to environmental factors.

2.1.2. Social and economical situation

Development in the Maldives tends to be spatially imbalanced due to the geographic and demographic peculiarities. Male' has emerged as the focal point of both economic activities and human settlement. Thus, Male' has been experiencing a high level of immigration from other islands of the country, contributing to congestion. The growing population is creating an increasing demand for employment, services and infrastructure including more dwellings and a greater variety of dwelling styles. Poverty in the country is related to remoteness of the islands from the centre and a lack of services in the atoll. The Maldives narrow economy relies on two key sectors - tourism, which accounts for 30% of gross domestic product, and fishing. Although tourism arrivals in 2003 reached a record high, this sector remains vulnerable to external factors.

In 2004, GDP grew by 8.8%, slightly faster than in 2003 (8.4%). As in the past, the expansion of tourism, up by 11.4% in GDP terms, fuelled growth in related sectors, including construction, transport and communications, and utilities. Tourist arrivals increased by 9.4% during the year and the average hotel occupancy rate rose to 84%, while foreign exchange earnings grew by about 19%. Tourism accounts for about one third of GDP, 70% of foreign exchange receipts, about 50% of domestic budget revenues, and almost 20% of employment. Fishing, the traditional mainstay of the economy (now about 6% of GDP), also enjoyed a good year with total exports up by about 22%.

The tsunami disaster was by far the greatest natural calamity experienced by the Maldives. While the loss of life was fortunately low, nonetheless it resulted in widespread damage to infrastructure facilities. About one third of the country's population of 290,000 was directly affected. Total damage is estimated at $470 million[2] or about 60% of GDP. Of this loss, the direct loss is $298 million or about 8% of the replacement cost of the national capital stock. Severe damage was caused to houses; some resorts; harbours; boats and other fishing equipment; schools; health facilities; transport and communications equipment; and water, sanitation, and electricity infrastructure.

Overall, macroeconomic development will be affected by the pace of restoration of tourism and fishing industries, as well as the volume and timeliness of external assistance that becomes available. The Government has projected a 25% decline in tourism in 2005 compared to 2004 as the peak holiday season was badly hit, though the fish catch is expected to remain largely unchanged due to a more intensive use of the fleet. Despite a sharp expansion in other sectors, such as construction and government services, which will compensate much of the decline in tourism, overall GDP growth is expected to decelerate sharply to about 1% in 2005, well below the pre-tsunami expectation of a 7.6% GDP expansion. Most of the resorts were not damaged and nearly all were operating normally by March. Since the country is a unique destination with well-established source markets for tourism, it is expected that arrivals will quickly rebound to nearly normal levels to push GDP growth to 9% in 2006.

2.1.3. Biological resources of economic importance

a) Tourism

The tourism industry, which started in the Maldives in 1972, has expanded rapidly. By 2004, 87 resorts were in operation with a total number of tourist arrivals reaching 615000 people. The occupancy rate has reached 77.20 % by the year 2003. Tourists stay on an average duration of 8 days. The sector gives employment to 17000 persons out of which around 60 % comprises of local em-

[2] Tsunami, Impact and Recovery, joint needs assessment conducted by World Bank, ADB, and United Nations, February 2005

ployment. Tourism is a continuously growing sector of the economy accounting for 33 % of the GDP ($ 415 million) in 2004 coming from 18,5 % of GDP ($ 334 million) in 1999.

The Maldives has gained a reputation among divers and snorkellers as an oasis for large fish species. In many other tropical countries sharks, groupers and other reef fish have already been exterminated due to over fishing. This has given Maldivian tourism a competitive edge in the diving market that generates millions US $ per year in direct diving revenue. It would be ironic indeed if the Maldivian reef sharks and groupers were fished to near extinction just as the Maldivian tourist industry is reaching its maturity. It is estimated that 30 % of tourists visit the Maldives for its excellent diving opportunities and 70 % for beach holidays.

At present, around 40 % of the total labour force in the tourism industry constitutes of expatriated staff, employed in unskilled, semi skilled or skilled jobs. The unavailability of adequately trained local personnel, and various social and cultural factors that inhibit Maldivians from taking up jobs at tourist resorts, are responsible for the large number of expatriates employed in the sector. Working conditions on the resorts is another reason for low local participation in the resort labour force.

EIAs are required for resorts buildings, jetties, sea walls and breakwaters. Resorts are required to install incinerators, compactors and bottle crushers, and a new resort must have sewerage treatment plants and outfalls.

b) Fish

The re-known fish fauna of the Maldives is likely to exceed 1.500 species. Despite this rich fish fauna, Maldives has very few endemic species. The reason is that all reef fishes have what has been called a two-part life history: adult and larva. While adult reef fishes may he bound to their coral homes, the larvae are planktonic and free to drift with the currents. The larvae of most species drift in the open ocean for at least one week and in some cases for several months. During this time they can be carried for hundreds, if not thousands, of miles by the ocean currents. As a result, the majority of Maldivian reef fish (probably about 80%) have very wide distributions that encompass the entire Indo-west Pacific or Indo-Pacific realm.

Fisheries used to be the dominant sector of the economy. However, in 1985 the tourism industry surpassed fisheries in terms of its contribution to GDP. Although the fisheries sector's gross earnings have been increasing over the years, the percentage contribution of primary harvesting to GDP has been declining. The contribution of fisheries to GDP declined from 10.7 percent in 1990 to 6.0 percent in 2004.

Maldivian fishermen favour tuna fish and continue to exploit these offshore species, as it has been done for centuries. The population prefers eating tuna to any other kind of fish; and the majority of the country's direct export earnings come from tuna fish. In the eighties the local demand for reef fish has grown in line with the growth of resorts and of Male'. At the same time, export markets have boomed.

The fishery sector gives employment to the inhabitants of the remote islands that do not have other alternatives for income generating activities. The livelihood of the communities in the atolls depends on the income, generated from the fisheries sector. The total percentage of people engaged in the fishing industry is about 25% of the total population[3]. The socio-economical importance of this sector is essential. Meanwhile the decline of contribution to the GDP by the fisheries sector was largely due

[3] MPHRE, 1998.

to the reluctance to open up this sector to the market forces. During the past decades, the Government's policy in fisheries was guided by the need to serve social objectives. This was important to protect the livelihood of fishermen and to ensure that Maldivians remain active in the fisheries industry which is essential for the food security. Lately the government policy has been more focused on encouraging private sector investments in the post harvest component of the tuna fishery resulting in production and export of smoked dried tuna and export of fresh chilled yellow fin. More recently, privatisation of state owned fish collection, processing and exporting company led to an increased private sector participation.

c) Agriculture

The soils of Maldives are alkaline deficient in nitrogen, potassium and several micro nutrients and are generally of low water holding capacity. Such soil characteristics are major constraints for the development of successful conventional agricultural production systems.

Primarily because of the limited area of arable land with generally poor soil and limited supplies of freshwater, agriculture is a comparatively small sector in the Maldivian economy. Meanwhile its importance to the economy is greater than its 3,6 % contribution to GDP, considering its role in generating employment and income opportunities in the atolls, improvement of food security, and greater self-reliance in part through import substitution of certain agricultural produce. The sector has always been the employer of mainly female labour force of the island population.

The lucrative market for agricultural produce, opened up by the growing tourism industry, has started to attract substantial investments to this sector. There has also been an increasing trend in farming in resorts islands for producing a significant part of tropical vegetables and fruits. In the face of build-up of invasive species and the spread of disease more and more people have to rely on usage of fertilisers and hazardous pesticides for their control which contaminates soil, harvested products, and the environment in general with its residues.

In addition, timber forest management through traditional tenure agreements is an important component of agriculture. Livestock production is limited to goat husbandry and poultry production. The latter takes place primarily in rural islands.

Many agricultural soils have also been washed out by the latest tsunami, leaving a high level of salinity that makes them improper for cultivation. After the retreat of the saline flood water, much of this salt remained in the root zone, raising the soil salinity in this zone. The high soil salinity level prevailed for some time after the flooding, until the arrival of the first rain that has washed down most of the salts and reduced the soil salinity in the root zone to safer levels. It confirms the high permeability of the subsurface and a direct connection between groundwater and the surrounding seawater. Due to the non-uniformity of the rainfall, there may be, however, some areas where the soil salinity is still a bit at the high side for sensitive plants/trees [4].

[4] Maldives, Post-tsunami Environmental Assessment, UNEP, page26, June 2005

2.2. STATE AND TRENDS OF THE ENVIRONMENT

2.2.1. **Pressures on the environment:** social and economic causes of the environmental situation and trends

a) Land reclamation

The Maldives has undergone unprecedented social and economic change over the past years. Within the last 5 years the overall population has increased by 10 percent while the urban population increased more compared to the rural population, increasing the demand for housing. According to the statistics the total number of households has increased by 19 percent while that of Male' increased by 22 percent. The better social services and infrastructure has resulted in a pull toward the economic centre where some 28 percent of the total population reside. The increase in population resulted in the increase in demand for housing, causing shortage of land area. Consequently, housing plots decreased in the size with continuation of subdivision of existing housing plots. Expansion and intensification of land use effects the environment leading to over extraction of groundwater and contaminated aquifer. Lack of space for housing, social services and recreation has resulted in social strains. To alleviate the problem associated with over crowding and congestion due to the scarcity of land and housing led to the reclamation and housing programs.

Similar to Male' in many of the islands the demand for housing is on the increase. At present 24 islands do not have additional land for housing while 2 islands (R.Kadholhudhoo and Lh.Hinnavaru) have a higher population density than that of Male'. These islands do not have the infrastructure and services of Male'. The extreme level of over crowding has placed great stress on vulnerable ecosystems, risk of infections and other social problems.

The Population Development and Consolidation Program was initiated with the aim of minimizing the serious diseconomies of scale faced by the country in the provision of socio-economic services by promoting economically viable population concentration on large islands. The strategy is to encourage the inhabitants of small and remote islands to voluntarily move to larger islands where the socio-economic services and employment opportunities will be in place.

The Regional Development Project was initiated as a part of the Population Development and Consolidation Program which target HDh Kulhudhuffushi and S. Hithadhoo as the growth centres of North and South. Loss of coastal habitats, particularly on sea grass beds, mangroves and coral reefs are associated with dredging of harbour as well as land reclamation. Meanwhile land reclamation could lead to severe environmental damages and risks to the population due to the loss of natural barriers such as coastal reefs and mangroves. The last tsunami has severely hit the Hulule international airport that has been built on reclaimed land without neither natural buffer zone nor an artificial dam for protection. The airport has suffered millions of US $ damages.

b) 2.2.1.2 Erosion

The islands of the Maldives are among the most susceptible to inundation from water rising from the ground, as well as overtopping dune ridges. Being composed of coral limestone, the islands of the Maldives are also among the least protected against sea level rise in the world. They are also extremely vulnerable to beach erosion. The shapes and size of these small islands are characterised by strong tidal and current patterns. The beach systems found on these islands are highly dynamic and have directional shifts within the shoreline in accordance with the prevailing seasonal conditions. An estimated 50% of all inhabited islands and 45% of tourist resorts at present suffer from varying

degrees of beach erosion[5]. Following the tsunami some islands have reported severe land loss, especially in the reclaimed areas.

c) 2.2.1.3 Housing construction

Reduction of habitat diversity and coastal biodiversity also occurs due to the clearing of vegetation. Because of the increasing population, demand for land is higher, thereby clearing vegetation for house construction is a continuously increasing trend. Today 24 of the 202 islands[6] do not have any area for new houses indicating that the natural vegetation of these islands are already cleared for housing and service infrastructure. Reduction of natural vegetation is also due to the logging of coconut and other woody trees for construction purposes from both inhabited and uninhabited islands.

2.2.2. Solid waste

Solid and hazardous waste management has recently emerged as one of the greatest environmental challenges in the Maldives. The amount and the rate of solid waste generated vary throughout the country and there is a significant difference between the amount of waste generated in Male' and that of in the atolls.

In recent years there has been a significant increase in the magnitude of waste management problems throughout the Maldives for a number of reasons, including, but not necessarily limited to: the small size of the island; the rapid growth in population; change in consumption patterns; transportation difficulties, coupled with the environmental challenges brought about by the growing tourism industry.

In Male' waste is not segregated at source, although backyard composting is practiced to a certain extent. According to the national authorities the existing solid waste management system in Male has improved compared to the general situation in the rest of the country.

All inhabited islands have a designated disposal site designated by the government authority. There is little provision of waste collection services and solid waste is managed using various methods. Due to distance and lack of awareness, random disposal of waste is a common practice. Organic waste is composted at home backyards in some of the islands. Non-biodegradable waste such as plastics is dumped near the beach in many islands and buried in a few islands. Approximately, 8.4% of inhabited islands have an additional fee system[7] operated by private entities. From 2003 onward waste disposal sites are in operation in the growth centres of North and South (HDh. Kulhudhuffushi and S. Hithadhoo) under the Regional Development Project.

Waste treatment equipment units are installed in many resorts. However, it is still reported that the poor ability to recycle waste creates localised nuisances such as smoke and odours in some larger resorts.

Following the tsunami, waste disposal sites on almost all affected islands were destroyed and the collected waste was scattered all across the islands including homes putting public health at risk. Leaking of waste into the groundwater lens is of concern as groundwater is used as the main source for bathing, washing and general use except drinking in islands.

[5] ERC, 2001

[6] State of the Environment, MEC, 2004

[7] Waste Management Survey of Inhabited Islands, MEC 2004

2.2.3. Fresh water

Future changes in climate and sea level will have impacts on the water resources. To the Maldivian community, the effect on water resources would mean changes in freshwater availability. The population of the Maldives faces a major limitation accessing safe drinking water. Until 1985, the population of the Maldives have been dependent on the shallow ground water aquifer for their groundwater requirement, including drinking. The climate and hydrology, sea level fluctuations and human activities influence the groundwater level and quality in the islands of the Maldives. Inundation of land and associated saltwater intrusion due to the predicted sea level rise would reduce the size of the freshwater lenses and thus reduce the available fresh groundwater of these islands. The groundwater is also very vulnerable to pollution by solid waste and other pollutants. Unsustainable withdrawal of water from the water lens has depleted the freshwater lens in several densely populated islands in Maldives. Meanwhile the precipitation scenarios generated by different climate models predicted, with low exactitude, that precipitation levels would increase for the Maldives. Before the tsunami only 39 inhabited islands[8] had groundwater appropriate for drinking. Meanwhile the tsunami washed out waste and sanitary installations, very probably worsening groundwater quality significantly.

a) Desalination

Desalination with reverse osmosis is widely used in the Maldives as a drinking water resource. To meet their water demands[9] 28% of the population of the Maldives and all the resorts depend on desalinated water. Scarcity of freshwater is aggravated by the saltwater intrusion and pollution of groundwater resulting from release of sewerage industrial effluents and poor agricultural practices. Today all houses, institutional and commercial establishment in Male' have been provided with desalinated water while rainwater harvesting is practiced by all the island communities of the country.

According to the data collected in 54 percent of the islands, ground water is not suitable for drinking and limitation is imposed by the quality of water rather than its quantity. Sh Kommandoo are the only inhabited islands that are served with desalinated water. To cater for the increasing demand for fresh water, private companies are providing mineral water.

2.2.4. Corals

Coral reefs have shaped the lifestyle of the people of the Maldives since its habitation and the modern economy largely depends on the health of the reefs. Two major economic driving forces, the tourism and fishery industries depend heavily on the reef resources. It is a source of food, beach sand, building material and protection for the islands. The protection provided by the coral reefs has reduced the storm damage, coastal erosion and flooding by extreme storm events. Healthy reefs not only act as a natural breakwater, but also as a natural captor of CO2.

The islands are vulnerable to extreme storm events, because of the low elevation level. A key concern of Maldivians is to know how the reefs will respond to the predicted accelerated sea level rise. Similarly, due to the potential vulnerability of the reefs to high temperature, they may be the first to show signs of ecological stress from global warming.

Although there was damage to coral and movement of sediments in all regions these perturbations varied in extent and intensity, surveys generally indicated that direct damage to reefs from the tsunami

[8] State of the Environment, MEC, 2004

[9] MWSA, 2001

was minor. However the reefs of Maldives are in an early stage of recovery from the massive bleaching in 1998 and the most significant consequence of the tsunami may be to hamper this process[10].

2.2.5. Biodiversity

The main types of ecosystems found are coral reefs, islands, sea grass, swamps and mangrove areas. Coral reefs are the major type of ecosystem that exists in the Maldives in terms of area as well the diversity of life.

a) Marine biodiversity

Direct threats to the biodiversity of Maldives include habitat destruction and over exploitation. Also, alternatives to usage of these resources are limited leaving people little choice. Atoll ecosystems literally provide the basis for the country's existence as well as life-supporting services such as shoreline protection and goods upon which the economy entirely depends such as fish and tourism. Pressures at the local level include coral and sand mining, destructive fishing, waste disposal of non-biodegradable imported products on the reefs, pollution and intensive use of reef through scuba diving and snorkelling. Loss of coastal habitats, particularly on sea grass beds, mangroves and coral reefs are associated with dredging of harbour, reclamation as well as grounding of vessel. Land clearance for housing endangers the sparse terrestrial biodiversity of many islands particularly the densely populated islands. Sand as well as coral aggregate are collected and used as construction materials to build wells, beams and sheet piles of the houses. Additionally, timber harvesting threatens the survival of old growth and hardwood trees on both uninhabited and inhabited islands. Meanwhile data collected revealed that demand for coral has decreased by many folds due to stringent measures applied and the availability of alternative building material. Increase of sea temperature due to climate change is also a major threat to the coral reefs.

b) Terrestrial biodiversity

Pressures on the terrestrial biodiversity include introduction of plant pathogenic micro organisms, insect pests and diseases. An influx of planting material and fruits and vegetables from neighbouring countries without proper quarantine procedure is leading to rapid build up of these pests and diseases. A number of planting material of unknown background is also being introduced to the country as ornamental plant, the risk of such material becoming a pest is a real threat though no such incidence have been recorded. In the face of build-up of invasive species and the spread of disease more and more people are relying on the use of fertilisers and hazardous pesticides for their control which contaminates soil, harvest products and the environment in general. About 20 percent of imported fertilisers are inorganic fertilisers such as mineral or chemical fertilisers. Seven types of household pesticides are also being used which are on an increasing trend.

Removal of vegetation also reduces habitat diversity and coastal biota. Today, 25 islands of the 202 islands do not have any areas for new housing indicating that the natural vegetation of these islands has already been cleared for housing and service infrastructure.

2.2.6. Energy

The main source of energy used for power generation in the Maldives is by combustion of fossil fuels, mainly diesel oil. Gasoline is used to fuel automobiles and marine outboard engines. Wood is the main

[10] Maldives, Post-tsunami Environmental Assessment, UNEP, June 2005

source of energy used in the rural areas for domestic purposes. The resultant depletion of wood has led to the growing use of imported fuels, such as kerosene and LPG (cooking gas). Solar energy is used for drying fish and fish products. Solar water heaters are used to some extent in the urban areas and solar PV systems are used in the navigation and telecommunication systems of the country.

Male' alone consumes almost half of the total fuel utilised for electrical power generation in the country, and the rate of consumption continues to increase. During 1998, Male' consumed an average 49,500 litres per day and by the first six months of year 2000 the average had gone up to 65,000 litres per day. In 1990, the electric consumption of Male' was 20,25 Million KWh; in 2000 it reached 90,48 Million KWh[11].

2.2.7. Air pollution

Air pollution refers to the contamination of atmosphere by the discharge of harmful gases mainly oxides of carbon, sulphur and nitrogen. Its adverse effects are pervasive and are disaggregated at 3 levels; local pollution confined mainly to pollutants emitted from vehicles, regional, pertaining to trans-boundary transport of pollutants and global related to build up of greenhouse gases.

As indicators of local air pollution, the number of vehicles and number of constructions of buildings, import of fuel and respiratory diseases all show an increasing trend with air pollution reaching levels of concern.

2.3. PRESSURES FROM THE ENVIRONMENT: **CONSEQUENCES ON HUMAN WELL-BEING AND SUSTAINABLE DEVELOPMENT - ENVIRONMENTAL CONSTRAINTS ON DEVELOPMENT**

2.3.1. Natural disaster risks

Its low-lying islands make the Maldives among the most vulnerable and least protected countries to the projected climate change and associated sea level rise. This is mainly due to its low elevation and fragile ecosystems, smallness, remoteness, geographical dispersion, lack of natural resources, small human resource base, and vulnerability to natural disasters, a highly limited internal market and an extremely sensitive and competitive external market. Further rising sea levels associated with a warmer climate could submerge or erode coastal properties and endanger the economy by affecting tourism and fishery.

2.3.2. Health

Changes in climate affect human health in various ways. Changes in air temperature, rainfall patterns, humidity and sea level rise are the main factors that indirectly affect health through vectors and or the transmission of diseases through water and air. Heat stress related health problems are identified as very much affected by climate change.

More direct impacts would be due to the extreme weather events as the rural islands of the Maldives would face limited access to health facilities and other services. The available facilities at the island level are very limited and the nearest facilities would be at the Regional Hospitals or the Atoll Health Centres. The main mode of transport to these facilities is by boat and during severe weather storms

[11] National Development Plan 2001-2005

it is virtually impossible to travel to these health care centres. Therefore, it is important to improve the health care facilities available at the island level.

2.3.3. Drinking Water

The water table of most groundwater aquifers is less than 1.2m below surface. The traditional sanitary and wastewater practices easily lead to the pollution of ground water due to the close proximity of groundwater aquifers to ground surface. Moreover, unregulated construction of septic tanks and the application of fertilisers, herbicides and pesticides lead to biological and chemical pollution of the groundwater aquifers that become not drinkable anymore.

2.3.4. Solid waste management

The worsening waste management situation increasingly results in pollution of the environment, and creates conditions harmful to public health. Further, if left uncontrolled, the worsening waste management situation may ultimately threaten the economic development of the country, which is closely linked with the tourism and fishing industries.

Moreover, it is estimated that the tsunami created approximately 290,000 cubic meters of demolition waste[12]. This amount combined with estimated 50,000 cubic meters of pre-existing household and other waste that had been washed out of their disposal sites makes sustainable waste management definitely one of the most environmentally challenging issues of the Maldives.

2.3.5. Land availability and human settlement

There are only 300 square km of land in the whole country for a population of 290,000 people. It means an average of 1,000 persons per square km. As only 15 % of all islands are inhabited, land deficit is on a higher trend taking into account 1,9 % growth rate of the population.

The Maldives has also undergone unprecedented social and economic change over the past years. Within the last 5 years the overall population has increased by 10 percent while the urban population increased more than that of the rural population, increasing the demand for housing.

According to the statistics the total number of households has increased by 19 percent while that of Male' increased by 22 percent. The better social services and infrastructure has resulted in a pull toward the economic centre where some 28 percent of the total population reside. The increase in population resulted in the increase in demand for housing, resulting in shortage of land area. Consequently, housing plots decreased in the size with continuation of subdivision of existing housing plots. Expansion and intensification of land use has its effect on the environment leading to over extraction of groundwater and contaminated aquifer. Lack of space for housing, social services and recreation has resulted in social strains. To alleviate the problem associated with over crowding and congestion resulted from the scarcity of land and housing has led to the reclamation and housing programs.

Similar to Male' in many of the islands the demand for housing is increasing. Analysis of the island situation during September 2004 revealed that 24 islands do not have additional land for housing while R.Kadholhudhoo and Lh.Hinnavaru have a higher population density than that of Male'. These islands do not have the infrastructure and services of Male'. The extreme level of over crowding has placed great stress on vulnerable ecosystems, risk of infections and other social problems.

[12] UNEP, June 2005

2.3.6. Food insecurity

Access to food and food security is still a major problem in the Maldives, this coupled with very high malnutrition in the country, is believed to be a result of both unavailability of nutritious foods and deficiencies in food habits. Maldivians rely heavily on tuna resources as a source of protein. It is assumed that a constant per capita consumption rate of 85 kg/yr was consumed during the mid 1980's.

Almost all food requirements, except fresh fish and coconut, are imported. Rice is the staple food of the Maldivians and it is mostly imported. Storage facilities in the islands are limited to local households and warehouses of small retail shops. The frequency of food supplies depends largely on the available transport and storage facilities.

A significant segment of the population is vulnerable to economic downturns because of the narrowly structured economy that is highly dependent on tourism and fisheries. The impact of an economic downturn, caused by export reduction, will severely hit the poor. It will lead to lowering of income and inability to purchase imported goods and services, which amounts to almost everything except coconut and fish. The country's ability to diversify the economy to mitigate risks is low due to the small size of island populations, lack of natural resources, high cost of transportation, and low levels of skills development.

3. ENVIRONMENT POLICY, LEGISLATIVE AND INSTITUTIONAL FRAMEWORK

3.1. ENVIRONMENTAL POLICY AND LEGISLATION

3.1.1. Policy

a) Strengths

Protection of the environment is a national priority in the Maldives, due to a significant number of efforts taken in order to incorporate environmental protection and preservation across several sectors. At the macroeconomic level, the government's policy is reflected in the "vision 2020" and the Sixth National Development Plan. The "vision 2020" states *"Maldivians will be able to take sufficient protective measures against the threats posed to the country as a result of global ecological degradation. They will be pursuing environmentally-friendly lifestyles with the aid of modern technology".*

The "Sixth Development Plan" emphasises on the comprehensive and integrated approach adopted by the government based on establishing of coordination and cooperation among the various sectors. The document highlights the objectives of the environment policy such as to promote sustainable resources management, minimise dangers to the natural resources and environment from economic development and population growth. It contributes to international efforts to find solutions to global environment threats emphasising on vulnerability of SIDS and promoting integrated planning and administrative practices by developing meaningful principles and procedures for sustainable resource base.

Environment sector policy is articulated in the National Environment Action Plan (NEAP) initially formulated in 1989 addressing the environmental planning and management needs of the country focusing on integrated approach for solving environmental problems through a sustainable approach. NEAP II released in 1999 laid the foundation for the present environment policy that is based upon a comprehensive framework that will be used for the next six years to ensure environmental protection and sustainable development in the Maldives. The aim of NEAP II is also to protect and preserve the environment of the Maldives and to sustainably manage its resources for the collective benefit and enjoyment of present and future generations. The main strategies forming the framework of the Second National Environment Action Plan are:

- continuous assessment of the state of the environment in the Maldives, including the impacts of human activities on land, atmosphere, freshwater, lagoons, reefs and the ocean; and the effects of these activities on human well-being;
- development and implementation of management methods suitable for the natural and social environment of the Maldives, and maintain or enhance environmental quality and protect human health, while at the same time using resources on a sustainable basis;
- consultation and collaboration with all relevant sectors of society to ensure stakeholder participation in the decision making process;
- preparation and implementation of comprehensive national environmental legislation in order to provide for responsible and effective management of the environment
- adhering to international and regional environmental conventions and agreements and implementation of commitments embodied in such conventions;

- strengthening of national capabilities, including institutional arrangements and human resources development for effective public participation, management and administration;
- financial support, co-operation and commitment to enable the action plan to be implemented in an efficient and cost effective manner.

b) Weaknesses

Sound environmental planning, management and conservation could only be achieved with cooperation from other ministries and through creation of a unified environmental policy that harmonises the ministries' and agencies' environmental policies. Implementation of the policies requires an implementation plan with responsibilities and actions tied to clearly identified timeframes and resources requirements, which also need to be embedded in the work plans of different line ministries and departments.

c) Assessment of environmental performance indicators

Considering the climate change projections on the unique geography of the islands the country's vulnerability to climate changes and sea-level rise is evident. More than 80% of the islands are less than 1 meter above sea level. The average size of an inhabited island range from 0.1 to 0.3 square kilometres per person, with the largest inhabited island being less than 5.2 square kilometres. Due to small size of the islands, most of the human settlements and vital infrastructure units are unavoidably located near the coastline, which is the area of high-risk damage due to climate change and predicted sea level rise. The IPCC Third Assessment Report estimates a predicted sea level rise of 0.09m to 0.88m for years 1990 to 2100 using the best estimates (IPCC, 2001).

A vulnerability assessment has been undertaken under the Climate Change Enabling Activity that identified a number of vulnerabilities such as beach erosion, damage to human settlements and infrastructure, degradation of coral reefs, impacts on the economy, salt-water impact on the underground water and vegetation with low salt tolerance on the island causing damage to the agricultural production. It makes the country vulnerable to changes in agricultural productivity and to competition on the international market for access to food products produced elsewhere.

Climate change has also a significant impact on human health. Increase in physical injuries and spread of epidemics are more likely caused during extreme weather events such as heavy rainfall. Increase in heavy rainfall in the country causes floods on many of the islands. Numerous flood incidents are reported each year during heavy rainfalls. These incidents combined with the poor sanitation systems in most of the islands, makes the population an easy prey to water borne diseases.

Adaptation options to climate changes are first developing adaptation activities targeted on specific sectors and secondly enhancing the capacity to adapt. Most of these adaptation options are costly. The three response options recognised include retreat, accommodation or protection. However, when responding to land loss and beach erosion, adaptation measures such as retreat, raising of the land and the use of building setbacks may not be viable solutions as these involve abandoning the coastal zone and shifting the associated ecosystems inland.

Hence, application of solid protection structures such as seawall may seem to be the only realistic option along the well-developed coasts, where vital infrastructure and human settlement are at immediate risk. A seawall has been constructed along the coast of Male' with the assistance of Japanese Government in order to protect high investments and resident population of Male'. There is a need for similar protective structures at almost all the inhabited islands to protect the rest of the

population. This will require enormous financial investments and technical capacity that will have to be obtained from international aid agencies and donors. The initial cost estimate has been projected at some US$ 1.5 billion for 50 of the inhabited islands (Gayoom, 1998) and this would mean US$ 6 billion for 200 inhabited islands (MHAHE, 2001).

Other adaptation measures for various sectors had been identified in the National Implementation Strategy for Climate Change (MHAHE, 2001), which was developed under the Climate Change Enabling Activity.

Understanding of the general climate change and sea level rise impacts on the Maldives requires extensive study of oceanographic and meteorological parameters. Rainfall patterns vary greatly at different locations in the country. Actually three stations that measure sea level and five meteorological stations measure the basic parameters required for general weather forecasting. . Research to understand the process causing beach erosion and to know how to manage such problems effectively is also of high importance to facilitate adaptation. According to MEWE more stations to measure sea surface temperature (SST), sea level and salinity need to be installed at various locations in the Maldives.

3.1.2. Legislation

a) Strengths

The enforcement of EIA regulation in the country began with the formulation of the Environmental Protection and Preservation Act (Law 4/93) in April 1993 in order to protect, preserve and safeguard the fragile environment of the country. The Environmental Protection and Preservation Act of the Maldives provided the basic framework for the EIA implementation process in the Maldives. According to article 5(a) of the Act, an EIA is to be submitted to the Ministry of Environment and Construction in accordance with the guidelines formulated by the Ministry before implementing any activity that may have adverse impact on the environment. Any modifications or alterations to the approved work need to be summated to the Ministry for approvals.

With the inaction of the law in 1994, Environmental Impact Assessment (EIA) has been made mandatory for all new development projects that may have an impact on the environment. The legislation provided the basic framework for the EIA procedure in the form of guidelines.

With the increase in legislative power, the National Commission for the Protection of the Environment (NCPE) has the mandate of advising the government on environmental assessment, planning and management and in ensuring that the environmental protection is a vital component of all development projects. The NCPE is composed of senior officials representing relevant government departments and is appointed by the President.

The EPPA is also supported by a number of laws pertaining to the sustainable management of the natural resources. These laws are vested and are being implemented by various departments of the country (government ?). The Law on fisheries (Law no 5/87) directs the Ministry of Fisheries, Agriculture and Marine Resources (MOFAMR) to conserve and manage the sustainable use of marine resources. The Act relating to Uninhabited islands (Law no 20/89) and the Act relating to Coconut Palms and Trees of Inhabited islands (Law no 21/89) authorise the MOFAMR to conserve all terrestrial flora and living resources in the Maldives. In the same manner, the Ministry of Tourism is implementing the Tourism Law (Law no 2/99) which came into force in 1999. Environmental controls on resorts are introduced through the law.

b) Weaknesses

Many gaps remain unfilled in the current legal system. Comparison of the law with the related areas and other legislation has revealed over lapping of responsibilities and conflicting goals. The environment protection and preservation act is very broad and has not been elaborated in sectoral legislature or regulations. There is also a need to strengthen the environment monitoring capacities at the atoll level and to enforce legislation to protect the environment. The Maldives legislation also faces the problem of coordination and consistency with international treaties and conventions. Although Maldives has signed more than 10 international treaties on environment and resources, the domestic legislation to implement these treaties has not been rectified. Such lack in enabling of legal and regulatory environment represents one of the major constraints to achieve an effective management of the environment.

At present EIA guidelines are also being reviewed. Under the current system the MEC guidelines for the development of EIA reports issued in 1994 do not specify project categories required for screening. Hence, all development proposals submitted to relevant authorities for approval are potentially subject to EIA and depend entirely on the discretion of the MEC. There is no system where the public can participate in the decision making process related to project proposals.

c) National Approaches to the major international and regional environmental conventions

The Maldives has continued to work in a wider international context because of the potential threats posed by externally generated problems and the collective responsibility for sustainable development at the global level. Thus, the Maldives has played a key role in highlighting the special vulnerability of low-lying small island developing states to the predicted climate change and in getting the attention to this issue on international forums. The Maldives is a party to the United Nations Framework Convention on Climate Change (UNFCCC), and was the first country to sign the Kyoto Protocol.

The GoM submitted the First National Communication to the United Nations Framework Convention on Climate Change (UNFCCC) in 2001. The work for completing the First National Communication was undertaken as a Climate Change Enabling Activity funded by the Global Environment Facility (GEF). Under this Enabling Activity, the National GHG Inventory was completed for the baseline year 1994. Options for mitigating GHGs were identified and a vulnerability and adaptation assessment undertaken.

In addition, a National Implementation Strategy to address climate change problems was developed. Most of the identified mitigation options from the energy sector are being undertaken from the Ministry of Communication, Science and Technology (MCST), which was the government authority mandated with the management of the energy sector.

The Ministry of Transport and Civil Aviation (MTCA) is at the development stage of the Maldives Transport Master Plan. The development of this Master Plan includes plans for the development of inter-atoll and inter-island ferry systems. In addition, the MTCA is also looking into feasibility of public transport systems in Male'. Better management of transport systems would help to contribute to reduce GHG emissions.

A National Implementation Strategy for Addressing Climate Change was adopted in 2001 to accommodate the main policy elements to integrate the issue of climate change into the national planning process. A number of activities have been initiated to implement the National Implementation Strategy for Addressing Climate Change. These include the establishment of the Energy Agency, formulation of a National Adaptation Plan of Action, (NAPA) undertaking of technology needs as-

sessment and actively participating in the international forums to advocate the special vulnerability of the small island developing states and least developed countries to the climate change.

The preparation of the NAPA began in 2004 to explore the feasible adaptation options to address the predicted climate change and sea level rise. A national Climate Change Team has been established to undertake this assessment. This team consists of stakeholder agencies from the government, private sector as well as NGOs.

A Technology Needs Assessment (TNA) is being implemented to enable the Maldives to strengthen further its capacity to participate in and contribute to the implementation of the UNFCC and to deal with climate change and its adverse impacts through the promotion of the integration of climate change concerns into the national development planning process. The TNA will assist to narrowing of the expertise gaps that currently exist between the country and most of its neighbours in the region in the field of climate change. The TNA will provide the basis for constructive policy choices that will direct and guide selection, adoption, implementation and use of sustainable technologies to help the Maldives to address concerns related to climate change.

The national capacity to address global environmental issues (in particular biological diversity, climate change and land degradation, sustainable land management) has been initiated in an integrated manner, with the aim of catalysing domestic and externally assisted actions to meet those needs. The National Capacity Self-Assessment (NCSA) will identify national priorities for capacity building focusing on crosscutting issues and synergies in the capacity development needs of the various thematic areas under the Rio Conventions.

Drinking water

Access to safe water is one of the major targets of the health sector, which is under the responsibility of the Ministry of Health. The Ministry of Health has outlined two main strategies formulated in the plan to provide safe water through the identification and promotion of sustainable systems that are appropriate for small islands for water production and distribution. Due to high investment costs, the actual policy is to encourage community initiatives in the provision of desalinated water. Developments in the areas include the formulation of regulations for the installation and operation of desalination plants, necessitating the submission of Environment Impact Assessment to the MEC. MWSA - UNICEF and WHO assisted programs also carry out the Awareness campaigns.

Waste Management

Maldives is a member of the Basle Convention on the Trans-boundary Movement of Hazardous Waste and its disposal. Under the Environment Protection and Preservation Act of Maldives, disposal of hazardous waste within the territory of Maldives is prohibited. The MEC is mandated to design and formulate a national policy on waste disposal and treatment and implement measures required to carry out such a policy. Additionally, the Environment Section of the MEC is responsible for waste management in the atolls while the Waste Management Section of Construction Section of MEC is responsible for the waste management in Male'. The Male' Municipality is responsible for providing waste collection services within Male'. The MEC is also in the process of developing a National Solid Waste Management Policy.

Air Pollution

Being an emerging environmental issue, MOTCA, MSCT as well as MEC aim to reduce air pollution through polices and strategies in their respective sectors. Transport sector has identified the reduction of traffic congestion in urban areas as one of its policies. MEC policy is based on an integrated approach developing meaningful principals and procedures for the environmental protection. An important policy in finding solutions to the environmental protection is to contribute to international efforts to find solutions to global environmental threats including air pollution.

The Asian Brown Cloud project was formulated as a second phase of the INDOEX project. The project features a strategically located ground based observation in the Indo-Asian and Pacific region to monitor atmospheric pollution. A surface climate observatory is being established and in operation at Hdh.Hanimaadhoo. The objective is to document changes in aerosol content, optical depth, chemical composition, aerosol radioactive forcing and cloud properties and to document changes in pollutant gases and some green house gases. The Male' Declaration on control and prevention of air pollution that is likely to effect South Asia was signed in 1998 between 8 South Asian countries. In 1999, an action plan was formulated highlighting the control of air pollution levels through a combination of legislation, regulation, voluntary initiatives and economic instruments.

Energy

The MSCT policies are to introduce new applicable technologies, set standards and goals and formulate guidelines to achieve them. The ministry also aims to explore the feasibility of energy producing sources that are suitable to the Maldivian environment. In order to facilitate future implementation of renewable energy projects the MSCT works with international organisations to identify and assess the renewable energy resources available in the country. The main areas that are of potential interest are solar, wind, biomass and bio-digestive material. The Energy sector has been transferred under the responsibility of the newly reorganised MEWE in July 2005.

Conservation of Biological Diversity

The most important policy decisions affecting biodiversity are taken at sectors such as infrastructure, fisheries, and tourism. Government initiatives to manage, change and mitigate the impacts caused are rooted in sector-by-sector approaches, resulting in narrow, sectoral institutions, policies, and interventions.

As conservation and management measures, 9 marine species have been prohibited for fishing or collecting and 15 marine products are prohibited for exports. In addition, 25 marine areas are declared as protected dive sites. Lack of data on abundance and distribution of species such as sea-cucumbers, aquarium fish, shark, grouper, and lobster as well as bait fishery has hindered the monitoring procedures. Monitoring undertaken at present relies mostly on export data, which is a major setback in implementing enforcement measures timely.

Strategies adopted by MEC include implementation of the National Biodiversity Strategy and Action Plan to ensure sustainable use of extractive and non-extractive resources. Recent activities undertaken include Maldives Protected Areas Systems Project implemented for the purpose of establishing replicable and sustainable systems of protected area management. A model site Eidhigali Kulhi of S. Hithadhoo was selected and a number of activities were undertaken. The site was declared a protected area on November 2004. As a planned activity Atoll Ecosystem based conservation of globally significant biological diversity in the Maldives' is another significant project to be implemented in 2005-

2010. The objectives are: mainstreaming biodiversity conservation issues into sectoral policies and programs, reinforcement of multi-sectoral institutions and relief of livelihood-related pressure on biodiversity by enabling local population to pursue more sustainable alternative livelihoods.

The tourism sector also highlights promotion of sustainable tourism through encouraging responsible planning and management practices of biological resources. This strategy is promoted through eco-tourism development and implementation of management plan for marine protected areas. Since 1997, the most environmentally outstanding tourist resort was awarded with the Green Resort Award. Similarly, the Ministry of Fisheries, Agriculture and Marine Resources has its policy towards development and management of the marine resources of the country in a sustainable manner.

3.2. ENVIRONMENTAL INSTITUTIONAL FRAMEWORK

a) Strengths

The Government of Maldives places environment as one of its top development issues on the agenda. The delicacy of the ecological system of the islands and vibrant role played by tourism and natural resources based industries of the economy call for sustainable development and environmental management to be given a key position on the government' agenda.

The environment sector was recognised officially as an entity within the government in 1984 with the creation of an Environment Division in Ministry of Home Affairs and Social Services. In late 1988 environment was given a higher status being combined with then the Ministry of Planning and Development to form the Ministry of Planning and Environment, the rationale for this movement being that environmental considerations need to be fully and efficiently integrated into the development planning within the country. As part of the government re-organisation in 1993 the Ministry was given additional responsibility of human resources development and was renamed the Ministry of Planning, Human Resources and Environment. In 1998, environmental administration was transferred to the Ministry of Home Affairs, Housing and Environment. Later in 2005 the environmental administration was transferred to the Ministry of Environment and Construction. Additional institutional development was the creation of an environmental research unit that was made into an environment research centre aiming at strengthening the scientific base for environmental decision-making process and assembling the necessary environmental information for planning and management.

At present the Minister of Fisheries, Agriculture and Marine Resources is the Acting Minister of Environment and Construction (now Ministry of Environment, Water and Energy). On a day to day basis, the Deputy Minister supervises the Environment portfolio which is divided among three major departments: the environment section (ES), the environment research centre (ERS) and the department of meteorology.

b) Weaknesses

Carrying out the mandate of the environment sector effectively, the environment section is confronted by many constraints. The complex nature of addressing the problems and issues of managing the Maldivian environment is difficult due to limitations of resources, personnel and technology. The mandate of the MEWE overlaps with the mandate of other ministries and government bodies. Environmental capacities at the atoll level and island level are virtually non-existent. Even within the environment portfolio, the required coordination among the environment functions particularly between ES and the ERC has caused duplication of effort and inefficiencies at a time when greater capacity is needed urgently. The lack of coordination can be attributed partly to the absence of a common operational

framework that integrates, coordinates and rationalises projects and activities based on common agenda and set of goals.

c) Safe Island Policy

The Population Development and Consolidation Program was initiated with the aim to reach economies of scale in order to be able to provide socio-economic services by promoting economically viable concentration of the population on larger islands. The strategy is to encourage the inhabitants of the small and remote islands to voluntarily move to larger islands where the socio-economic services and employment opportunities are already in place. The long-term objective is to ultimately reduce the number of inhabited islands and consolidate the population in smaller groups of settlements across an identified number of islands by dividing the country into 5 regions comprising (a) regional focus islands, (b) atoll focus islands and (c) primary islands. The Regional Development Project was initiated as part of the Population Development and Consolidation Program that targets HDh Kulhudhuffushi and S. Hithadhoo as the growth centres of North and South.

The recent tsunami disaster has yet again underlined the importance of population consolidation program as well as emphasised the critical importance of providing environmentally safe zones for isolated communities living in distant islands. Most of the islands that were destroyed had little or no coastal protection. Some of them had also been reclaimed to the full extent of the lagoon. These conditions fully exposed them to the dangers of wave action, erosion and flooding, and increased their vulnerability to environmental disasters. The recent tsunami experience has shown that if the country is to recoup and regain the social and economic progress achieved over the last 20 years, urgent re-thinking is required in settlement planning and socio-economic development of the atolls, in a way that is financially sustainable and ecologically safe. It has become clear that not all islands are ecologically safe, and highlighted the importance of integrating safety considerations in its widest sense in planning of the development of low-lying islands. It has become necessary to develop a concept of Safe Islands as part of the overall atoll development strategy.

The Safe Islands concept would extend the population consolidation approach to incorporate the aspect of extreme vulnerability and develop measures to mitigate ecological disasters. It would also enable the communities to sustain social and economic development in times of emergencies and disasters by providing ecologically safe zones. These areas are of prime importance to reduce tsunami hazards and other disasters by establishing building and construction codes that would enable vertical evacuation if and when necessary and provide all basic services in an emergency situation, particularly health, communication and transport infrastructure, and have a buffer stock of basic food stuffs and water.

The Safe Islands programme would provide an important opportunity to revise the development strategies, provide wider development options for the population and to improve the infrastructure and facilities rather than to simply replace what was lost in the disaster.

The objectives of the Safe Island Program are:

- Protection from natural and other disasters
- Rebuilding and improvement of the existing infrastructure and economic facilities
- Ability to plan and implement effective measures to reduce environmental hazards and surviving disasters

The features of the Safe Island Programme include:

- *Coastal Protection*
  Provide coastal protection against sudden wave action or storm surges by building strong coastal fences and develop environmental protection zones and green belts to provide natural fence systems in vulnerable areas of the island.
- *Access*
  Redevelop harbours and channels to provide speedy access for the emergencies
- *Transport*
  Strengthen transport infrastructure including the provision of land, sea and air transport facilities such as storm resistant jetties, airstrips and helipads where feasible
- *Communication*
  Institute alternative communication systems such as VHF and other systems that could be used when the normal telephone systems are out of function
- *Economic Viability*
  Ensure the economic viability of communities by using scale economies derived from larger populations and sufficient infrastructure, transportation and communication facilities and financial services and banking facilities to develop a financial asset base
- *Social Services*
  Provide adequate social services including emergency health facilities, medical personnel and a stock of basic medicines
- *Housing and Construction*
  Redesign and redevelop housing designs and building codes to give weight to environmental protection features, including multi-storey structures that could be used for vertical evacuation
- *Safe Zones*
  Develop elevated safe areas and provide all emergency supplies and facilities
- *Emergency Supplies*
  Establish a mechanism to sustain a buffer stock of emergency supplies in all islands including basic foodstuffs, medicines and water

The criteria for Safe Islands would include the following:

- The island must have easy access to an airport
- Must have sufficient space and potential for land reclaim and/or the possibility of connection with another island
- Must have a viable economy and social services
- Must have sufficient space for subsequent population growth

d) Safe Island development Programme

The main problem facing the country before the 26th December disaster was to assist a population scattered on some 199 islands. Before Tsunami, the GOM policy on Population and Development Consolidation has identified 3 options:

- Physically connect island through combined harbour projects, infrastructure, etc.
- Establish ferry links between islands which are close by (same atoll) so that people can commute to work, e.g. between Male' and Villingili or Male' international airport on Hulhule island;

- Provide incentives for isolated island communities who request to relocate to larger, more economically viable safer islands.

The Government's Regional Development Strategy has regrouped islands into 5 main regions/ group of atolls within regional proximity will be covered under one administrative region. An economically viable regional development centre would be identified and developed in each region. These regional centres or regional focus islands would have tertiary level socio-economic infrastructure such as regional ports, regional hospitals, higher secondary level education and campuses of the Maldives College of Higher Education (MCHE). Within each region, each atoll will have atoll focus islands with secondary level infrastructure such as harbours, hospitals and secondary schools facilities.

In regional or atoll focus islands, employment generation activities and private sector opportunities would be provided to stimulate and develop a sustainable economy.

On isolated islands, public services such as primary schools, jetty maintenance, power generation, health posts, etc., would be continued or maintained by the authorities. These communities will be given housing finance and employment incentives for voluntary relocation.

Upon initiation of this strategy, the Government has been receiving requests for consolidation and relocation of excess of its budgetary capacity.

By 26th of December 2004, some 17 islands had requested for relocation. Government started housing finance projects whereby 48 model houses were to be built, as a pilot project on 2 islands: Sh. Funadhoo and L.Fonadhoo.

Following the Tsunami, the Government adopted a major policy of providing – or rebuilding – a house or repair assistance o each family (within six months for repair works, one year for new constructions) on location of their choice. This period would be extended to 18 – 24 months if major work for reclaiming the land or re-compacting the ground were required.

In the case of hard hit islands, populations had requested relocation in safer islands under "Safe Islands Development Programme". These islands would become self-reliant in the management of emergencies for at least the first 24 hours, building on the knowledge for rendering them safer to the population (improved communication networks and early warning system, more resistant jetties, etc..).

People wishing to relocate will be provided assistance and permanent housing. The Government is cautious to implement reconstruction and development programmes in high-risk situations on a few islands that were particularly vulnerable, with massive land erosion and continuing land subsidence. However, no forced relocation will be conducted.

So far, 3 particular islands have already been identified for complete relocation to other locations: Raa Kandholhudhu (pop. 3,664); Meemu Madifushi (pop. 204); and Dhaal Gemendhoo (pop. 500). Assessment is still ongoing to determine other islands that may qualify for complete relocation.

Thaa Vilufushi island sustained heavy devastation during the tsunami and its population evacuated. The Government authorities are undertaking a major reconstruction programme there before allowing its residents to return.

Meemu Kolhufushi, Muli and Naalaafushi; and Gaafu Alifu Villingili also sustained heavy devastation during the tsunami and the residents evacuated to the harbour. Major reconstruction works are required to rehabilitate the land and provide permanent housing for homeless population of these islands.

Current planning for the Laamu Gan Island is to facilitate the resettlement of 3,000 population from other islands with optimum economic infrastructure, industries and tourism. Agriculture land would be offered to the new residents.

A number of other islands that sustained substantial damage from the tsunami are requesting for relocation to safer islands. However, there are still small population numbers in these islands who have expressed the wish to stay on these hard hit islands.

3.3. INTEGRATION OF ENVIRONMENT CONCERN INTO THE MAIN AREAS

The cross cutting nature of the environmental issues was well-recognised and highlighted in the NEAP II. The document emphasised a more comprehensive and integrated approach in order to allow for more coordination and cooperation amongst the sectors concerned and as a way to deal with environmental management actions that might not be addressed through individual approaches.

The major issues faced by the Maldives in the area of environment protection and preservation have been identified and discussed in the Second National Environment Action Plan:

1. Climate change and sea level rise
2. Coastal zone management
3. Biological diversity conservation
4. Integrated reef resources management
5. Integrated water resources management
6. Management of solid waste and sewerage
7. Air Pollution and management of hazardous waste
8. Sustainable tourism development
9. Land resources management and sustainable agriculture
10. Human settlement and urbanisation

In addition to the above issues the 6th NDP considers the shortage of adequate human and financial resources as two major issues that need to be addressed during the Plan period.

NEAP II has highlighted that these 10 key issues can only be achieved by working within the Government's overall environmental policies and agreed action plans and through building partnerships with all the parties sharing common objectives. Emphasis has been made to maintain the existing partnerships and develop new ones with key stakeholders. To some extent, this has been achieved due to the fact that many other sectors have integrated environmental resources management actions into their programs. These include the National Environmental Health Action Plan, Sustainable Tourism Master Plan, Agenda for integrated Reef Resource Management Program and Integrated Atoll Development Program.

However, in practice the main obstacle in achieving the integration of environment concerns into the main sectors occurs due to the sector by sector approach undertaken by the ministries concerned. Each ministry develops its own work plan and program according to their mandates and takes commitments to fulfil their own work plans and programs. At present some ministries have established their own environment-related policies and programs leading to overlap and in some cases conflict.

The following frames mainstream environmental issues into several sectors:

ISSUES/PROBLEMS	REASONS	RECOMMENDATIONS	TO WHOM
1. ENVIRONMENTAL EDUCATION AND AWARENESS			
> Natural resource destruction > (example over exploitation of certain species of fish) > Environmental pollution(dumping of waste) > Social problems > Lack of human resources, materials and activities > Lack of environmental awareness	> Limited knowledge, and research > Poverty > Poor governance > Poor implementation of law > Lack of financial support > Lack of extension services	> Integration of the environmental program into formal and non-formal education > Improving awareness through state and private mass media > Human resource development	> Min. of Environment, > Min. of Agriculture & fisheries, > Min. of Education, > Min. of Youth & Sport, > Min. of information Arts & culture > Min. of Education, -Youth & Sport, > NGOs, UNDP, > EU
2. WATER AND ENVIRONMENT SALTATION			
> Inadequate sanitation in the atolls > Lack of a sound waste management policy	> Lack of resources and finance > No proper guidelines, standards	> Provide adequate safe water and sanitation and waste disposal facilities > Develop a waste management strategy > Develop standards and guidelines for islands	> Min. of Health > Min. of Environment, Water & Energy > Min. of Planning & Development
3. RURAL DEVELOPMENT			
> Damage to infrastructures > Damage to communication > Contamination of Water supply > Damage to agricultural land > Damage to fishing boats	> Tsunami	> Develop infrastructure > And create jobs > Provide overall development	> Min. of Planning & Development > Min. of Construction & Public Infrastructure > Min. of Atolls & Development > Donors > Private companies > Banks
4. TRANSPORT			
> Pollution in Male' > Congestion of road traffic in Male' > Lack of well developed transport system between the island	> Poor planning > Lack of finance > Lack of human resources > Geographical dispersion of the island	> Development of a Public transport system > Physical Development plan for Male' and other focus islands	> Min. of Transport > Male' Municipality > Construction company > Min. of Housing & Urban Development > NGOs Concerning > Donor:.. > Min. of Finance

ISSUES/PROBLEMS	REASONS	RECOMMENDATIONS	TO WHOM
5. AGRICULTURE			
> Misuse of pesticides and fertilisers > Diseases > Under developed agriculture system	> No proper control of use of pesticides and fertilisers > Lack of extension services	> Public information > Enhancing capacity in use of pesticides and fertilisers	> Consumers > Businessman > Min. of Fisheries & Agriculture > Min. of Environment, Energy & water
6. FISHERY			
> Degradation of fishery resources > Food insecurity	> Lack of awareness	> Enhancing law application	> Min. of Fisheries, Agriculture & Marine Resources
7. POWER/ENERGY			
> Shortage of electricity supply, high price, peoples use oil as energy for daily lives, lack of electricity of rural areas.	> No budget for energy development > Geographical dispersion of the island	> Use of energy efficient appliances > Use of environmentally friendly energy	> Min. of Environment, Water & Energy > STELCO

4. EU AND OTHER DONOR COOPERATION WITH THE COUNTRY FROM AN ENVIRONMENTAL PERSPECTIVE

Table 1: official development assistant of external grants for environment related areas from 2002 to 2005
External Grants and Disbursements for the development of the environment, 2002-2005[13]

FUNDING SOURCE	PROJECT	TOTAL COST (USD)	STATUS	AREA	IMPLEMENTING ORGANISATION
Canada	Deepening of the Channel in Kudafari	15840	Complete	Harbour	Kudafari IDC
Canada	Holhudhoo Water Supply Project	5615	complete	Water	Holhudhoo IDC
Canada	Holhudhoo Island Waste Management Pilot Project	12000.00	Ongoing	waste	N. Holhudhoo
Denmark	Fuah Mulaku Harbour Project (grant component only)	1047619	Ongoing	harbour	Ministry of Construction and Public works
Germany	Rehabilitation of Male' Sewerage Systems	8981396	ongoing	Sewerage	Maldives Water and Sanitation Authority
India	Construction of Jetties	N.A.	Ongoing	Jetties	Ministry of Planning and National Development
New Zealand	Lhaimagu Island-Rainwater Collection Tanks	8470	Ongoing	Rainwater	Lhaimagu Island
UNDP	Human Resource Development in meteorology		Ongoing	Meteorology	Dept of Meteorology
UNDP	TA for the formulation of the Sixth National Development Plan	161000	Ongoing	Overall planning	Ministry of Planning and National Development
UNDP	Vulnerability and Poverty Monitoring Study for Maldives	84000	Ongoing	Overall Assessment	Ministry of Planning and National Development
UNDP	Assistance to Maldives in Developing the Energy Sector through Energy resource Assessment Leading to Sustainable Energy Policy Formulation	278000	Ongoing	Energy	Ministry of Communication Science and Technology
UNDP	Institutional Support for Coordination and Integration of Environmental Consideration in National and Atoll/Island Policies, Budget and Administration	70000	Ongoing	Institution Develop-mint	Ministry of Home Affair Housing and Environment

[13] Ministry of Planning, 2005

FUNDING SOURCE	PROJECT	TOTAL COST (USD)	STATUS	AREA	IMPLEMENTING ORGANISATION
UNDP	Preparatory Assistance for Renewable Energy Technology Development Project and Application Project	8990	Ongoing	Energy	Ministry of Communication Science and Technology
UNDP	PA for a Solid Waste Management Project	20000	Ongoing	Waste	Ministry of Fisheries Agriculture and Marine Resources
UNDP/GEF	National Biodiversity Strategy and Action Plan And Country Report to the COP	162886	Ongoing	Biodiversity	Ministry of Planning Human Resources and Environment
UNDP/GEF	National GHG Inventory and Vulnerability for the Maldives- A climate Change Enabling Activity	839900	Ongoing		Ministry of Planning Human Resource and Environment
UNDP/GEF	Conservation and Sustainable Use of Biodiversity Associated with Coral reefs in the Maldives	335000	Ongoing	Biodiversity	Ministry of Home Affair and Environment
UNDP/GEF	National Capacity Self Assessment for Global Environmental Management	25000	Ongoing	Climate Change	Ministry of Home Affair and Environment
UNICEF	Safe and Sustainable Environment	835000	Ongoing	Environ-mint	MWASS
Centre for Cloud Chemistry & Climate USA	Establishment of Surface Climate Observatory at Hanimaadhoo	120,000	Ongoing	Pollution	Department of Meteorology
UNEP	Preparation of National Sustainable Development Strategies and Establishment of Multi-stakeholder Mechanism	60,000	Ongoing	Sustainable Development	Ministry of Environment, Energy and Water
UNDP/GEF	Atoll Ecosystem Based Conservation of Globally Significant Biological Diversity	8698050	Ongoing	Biodiversity	Ministry of Environment, Energy and Water

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

While the Maldives economy is highly dependant on 2 sectors directly linked to natural resources, the country faces a lack of natural resources to improve the welfare of its population. Food products (except fish), fossil energy and construction materials such as wood have to be imported.

While the GoM promotes the use of environmental regulations and guidelines, it has difficulties to enforce them. There is also a lack of ownership of the numerous recommendations and policies that have been advised by various development agencies. The GoM does not have the capacity to apply numerous international rules and policy recommendations because of too high running costs of administration of a 900 km long country with the population spread on 200 remote islands.

While the GoM has little influence on the rise of sea level and the increase of rainfalls and sea temperature, it faces high financial costs for reducing the impacts on human safety and biodiversity preservation.

In order to prioritise sectors that are closely linked to the environmental issues, the Ministry of Environment and Construction has been reorganised into the Ministry of Environment, Energy and Water in July 2005.

5.1.1. Poverty alleviation and development

Many of the communities among the 200 inhabited islands are subjected to extreme hardships and vulnerability, because of high population density or environmental problems such as land erosion, desertification and fresh water depletion. It is estimated (VPA, 1998) that 42 percent of the Maldivian population lives under Rufiyaa 15 (1 Euro) per day. The government encourages the inhabitants of such impoverished islands and facilitates the process through government housing subsidies and other infrastructural support tools. The poverty and deprivation in the Maldives are also exacerbated by geographical constraints, especially in terms of costs and feasibility of implementation and monitoring. Out of any governmental projects, it is estimated that at least 40 % of the budget is for transportation costs[14]. At the same time an emerging dual economy with a rapid expanding modern sector which is almost exclusively located in Male' alongside subsistence sector located in the Atolls adds to the difficulties in addressing poverty efficiency.

In order to reduce the concentration of economic opportunities in Male' and to ensure a broader based equitable development, the GOM promotes the regional development process including economic development, provision of health care services, education and infrastructure. Regional development is designed with the principle of sustainable development and aimed at promoting, expanding and strengthening of economic diversification. It is also designed to provide a wide range of employment and investment opportunities by building on the existing economic, environmental and social competitive advantages in the regional growth centres. While the population and development consolidation policy involves providing incentives to migrate to focus islands, the interim fall-out of

[14] Ministry of Atolls Development, 2005

this policy is that the most vulnerable group of the population from the primary islands – the elderly and the frail - are often left behind.

5.1.2. Safe Island Policy

Adaptation options in the low-lying islands of the Maldives are limited and measures to respond to climate change or its adverse impacts are potentially very costly. Though it is important to protect all the islands of the Maldives, including uninhabited islands, priority has been given to protection of human settlements and infrastructure by focusing first on the inhabited and resort islands.

Inadequate access to good quality health care and education also contributes to the poverty in the Maldives, particularly in the Atolls. Poverty is also further aggravated by lack of access to adequate transport and communication services, drinking water, electricity and essential consumer goods. Information isolation, limited capacity to foster economic development, and high cost and poor quality of electricity, transport and telecommunications services in the Atolls also contribute to poverty. Therefore, the GOM has stated that it will achieve economies of scale by concentrating populations and developing them as growth centres with community access to public facilities and services. The Safe Island Policy wishes to link human safety to growth and poverty alleviation.

The Safe Island Policy promotes the concentration of dispersed population on safer islands. Many investments need to be realised in order to help settle the newcomers: construction of schools, hospitals, housing, sea shelter, drainage zone, desalination plants, airport and development of income generating activities. This programme shows clear challenges of promoting environmentally friendly activities such as alternative energy sources, sustainable solid waste and sewerage systems, coastal management….Meanwhile land reclamation could lead to severe environmental damages and risks to the population due to the loss of natural barriers such as coastal reefs and mangroves.

5.1.3. Erosion

Undisturbed mangrove forests proved remarkably resilient to direct tsunami impacts. Most mangrove trees have widespread root networks and strong, flexible stems ideally suitable to withstand a strong surge. It appears that aerial stilt roots have sieved debris from the tsunami wave, increasing the quantity of deposition. Therefore, the mangrove trees are important actors in coastal defence system that would protect the coastline against storm waves that will become more frequent as the sea level is expected to rise by 12-18 cm by 2030.

5.1.4. Tourism

Despite the rapid progress, the tourism markets and the tourism products are not adequately diversified. Most tourists come from one region, i.e. Western Europe, and their main interests are relaxation on the white sandy beaches or the tropical island environment, and scuba diving or snorkelling. However, as indicated in the Second Tourism Master Plan, there are several issues that still need to be addressed to maintain the level of growth and a competitive edge in an increasingly competitive international travel industry, which is undergoing rapid change. On a minor scale, the sector has provided employment to all the regions of the country. In terms of tourism development, the government policy is to direct tourism towards those regions that at present have regional airports. The Government of Maldives represented by the Ministry of Tourism has announced the development of an additional 1600 beds in the 11 designated islands. When the new 11 islands become developed as resorts it would provide an additional 1600 beds to the tourism industry, which will ensure that each atoll from which the island originates, will have 200 tourist beds (SoE, 2004).

Sufficient long-term investments for financing the tourism sector is not available locally. Maldivians often turn to foreign parties for funding the investments in return for a significant share of assets. An increasing number of investments in the sector is also being made entirely by foreign parties, mainly because Maldivians are unable to secure investment funds on their own. Thus, there is an urgent need to identify sources of financing for locals to invest in the tourism sector, and thereby retain a larger share of investments and profits within the Maldives and in Maldivian hands. According to the actual existing costs in the resorts, there are still many opportunities in this sector such as sport facilities, accommodation, islands and ecological tours, gastronomy…The resort business remains highly lucrative.

5.1.5. Education

"Overall learning achievement among primary students is very low and a significant gap exists between Male' and the Atolls population. Secondary terminal examinations also show poor results. The low quality of education is the result of 40 percent of the teachers being untrained, lack of teaching/learning facilities and lack of an adequate national system to manage, monitor and supervise education process. It is also because of the system's inability to employ good quality expatriate teachers and the poor curriculum relevance. The system's ability to provide services for special needs of students is also a concern with regard to improving the quality of education." The assessment that was made in the 6th NDP (2001-2005) is still valid according to the Ministry of Atoll Development. There is also a lack of Maldivian qualified staff willing to work in remote islands.

5.1.6. Energy

The ever-increasing consumption of imported fuel for electricity generation and in sectors such as fisheries, tourism, and transport is an issue of concern. Dependence on fossil fuel makes the Maldives vulnerable to fluctuations of fuel prices on the international market.

Although the Maldives' equatorial exposure to sunlight would seem to make the country especially conducible to solar power, this clean, renewable and abundant source has scarcely been tapped to date. Solar heating is primarily used in the resorts, where approximately half of the hot water is solar heated. In 2004, a survey[15] concluded that as much as 10-15 % of the Maldives energy requirement (excluding transport) could be met by exploitation of these renewable resources. At present, only a quarter of this potential is being realised.

5.2. RECOMMENDATIONS

On a territory of less than 300 Square km many recommendations should be advised to reduce negative impacts on the environment, therefore, there should be an effort from the state to enforce environmental guidelines, particularly in the field of solid waste and sewerage management, water supply, alternative energy supplies and reduction of coastal erosion. There should be an evaluation of the NEAP II (2000-2004) and the 6th NDP (2001-2005).

Many environmental recommendations have already been proposed in the SoE 2004. The following recommendations are related to possible EC projects for the CSP period 2007-2013 according to its priority to support the Safe Island Policy.

[15] Ministry of Communication, Science and Technology

5.2.1. Economic diversification

a) Tourism

The tourism sector has highlighted the promotion of sustainable tourism through encouraging responsible planning and management practice consistent with the conservation of the natural heritage of the Maldives. To attain this policy the strategies are: promotion of eco-tourism development, revision and implementation of the management plan for marine protected areas, encouragement of greater co-operation between the tourism industry and those responsible for the management and the protection of the country's fragile marine environment, enforcement of environmental impact assessment process for the tourism development in order to minimise the impacts of development on the natural environment, and raising awareness regarding the environment impact on tourism.

Therefore, environment should be more related to creation of employment as most of the state revenue depends on the sustainable management of natural resources. Eco-tourism should be encouraged through training of Maldivian staff and realizing of the environment friendly investments.

Safe islands are considered as growth centres. That is why it is necessary to create employment for as many people as will settle there in future. As the most important revenue of the state is tourism related, it is wise to develop tourism activities near these growth centres and Safe Islands. It represents a prospect for tourism diversification as tourists are attracted not only by the biological resources, but also by cultural exchanges. As an example, Meeru island is a Safe island that has a resort with 260 rooms. The interrelations of tourists with Maldivian people are also appreciated. Therefore, it is also recommended to develop the safe islands for touristy purposes. To cater to the changing needs of the market and to ensure growth of the industry, it needs to diversify its markets and products. Thus, measures are required to be taken in order to encourage more Maldivians to obtain and retain jobs in the tourism sector, including middle and top management level jobs in the tourism industry. The Ministry of Planning should take these aspects in its Safe Islands investments plans, but also into the negotiation with the local population as a prospect for employment creation and diversification.

There should be promotion of resort development involving a higher financial return for the Maldivian population. The concept of integrated resort management should be encouraged. The new resorts have to be built closer to the Safe islands insuring a regular availability of employment. Therefore, Safe Islands should also be built according to high environmental standards. Training should be given in the service sectors like sport facilities, accommodation, islands and ecological tours, gastronomy…

b) Fishing

The tuna is fished in a sustainable manner in the Maldives as there are only fishing lines authorised. Therefore the valorisation of the tuna fish should be more according to its real commercial potential as upgraded to the market according to environmental sustainable products. It is wiser to develop the market for fresh and smoked products rather than for canned products.

c) Other activities

Environment friendly activities should be prioritised in the Safe islands such as smoked tuna factories, clean energy production, solar desalinisation plants, organic agriculture, raw fish and bioethical restaurants… As the Maldives is one of the world countries facing the highest environmental stress, livelihood development through the sustainable management of its natural resources will provide its population with new types of income generating activities and also train them to live in a closer posi-

tive relations with the environment. Environment should be regarded more as a vulnerable friend rather than a menacing enemy.

5.2.2. EIA

Environmental Impact Assessment (EIA) that is now required for any infrastructure development associated with the tourism sector should also be integrated into any Safe Island infrastructural project.

It should be necessary to increase the environmental standards for any human related activities that could have a negative environmental impact. Therefore, the standard ISO 14001 should be adopted as much as possible.

5.2.3. Poverty alleviation and regional policy

A Regional Development Management Office (RDMO) will be set up in any of the 5 regions defined as North/North Centre/Centre/South Centre/South. Actually only 2 offices are operational. It is recommended to support this decentralised process of regional management with capacity building and training courses. This support should help the RDMOs in defining the best development strategies in poverty alleviation and regional development. The EC SI support programme to Muli and Kudahuvadhoo should be realised through the strengthening of the RDMO of the South Centre region

5.2.4. Health related to environment

Apart from a general need of qualified medical personnel, training in public health issues is necessary since it is closely linked to the environmental concerns.

It should be necessary to adopt strong environmental standard like ISO 14001 for any public and private investment that could have a negative impact on public health.

5.2.5. Education related to environment

The secondary curriculum needs to be diversified to meet the needs of the growing number of secondary students and to make learning more relevant to social and economic needs.

Emphasis has to be made on expanding higher education opportunities, facilitating private sector participation in education, and increasing the number of local secondary school teachers.

Establishment of good governance is also needed through community-based system for sustainable management of marine resources and promoting sustainable use of fish resources at the grassroots level through formal, non-formal, and adult education system. Works in the area also include continuous assessments of biodiversity of reefs and ecosystems under potential threats.

5.2.6. Sewerage

In the Safe Islands, it is recommended to adopt a communal sewerage system rather than individual ones. As the GoM plans to install compounds for the new inhabitants, it is more effective to plan a communal collection system that will ease the treatment of sewerage by efficient plants according to strict controlled standards. Individual sewerage collection systems are not recommended as being more difficult to treat and monitor, that could lead to pollution of the groundwater or the coastal zone.

Implementing measures such as banning pre-treatment of sewerage discharged on to the reefs would minimise the human impact on the reef and thus improve the health of the reefs.

5.2.7. Solid waste management

The burning of garbage with a co-generation system has the advantage of producing electricity and reducing the volume of garbage. It should be closely considered as each Safe Island will be home to thousands of new inhabitants that will progressively produce around 2,5 kg of garbage/person/day (average of Male'[16]). It means an average of 12,T/day for an island of 5.000 inhabitants.

All efforts to preserve the environment need to be strengthened to ensure that the natural beauty of the country, which is the main attraction for tourists and the main source of country revenue, is preserved.

5.2.8. Agriculture

Any new system of crop production that can increase the local output of fruit and vegetables such as hydroponics would help to reduce the present level of imports thus reducing the cost and increasing income levels for farmers. Hydroponics cultivation can be implemented in any island having access to fresh water. Therefore, it can become a protein and vitamin source for the growth centres such as safe islands.

5.2.9. Energy

Alternative sources of renewable energy have to be tapped to reduce the dependence on imported fuel. Meanwhile the government has strict priority of investment related to tsunami recovery and enforcement of the Safe Island policy. Therefore, the alternative energy sources should have more than ever a cost-effective advantage compared to the traditional ones. Measures need to be taken to introduce alternative sources of energy. In this country, cost-effectiveness of energy use is loosely linked with environment preservation effectiveness. It is recommended to use solar panels on house roofs for hot water production in all the Safe Islands new compounds.

a) Solar energy for desalinisation

Reverse osmosis desalination technology, is an energy intensive process that depends on diesel fuel. Introduction and utilisation of solar distillation or desalination with solar energy would reduce the dependence on diesel for water production and hence has the potential to reduce GHG emissions from the Maldives. Changing to such technology could increase the security of water resources and make it less vulnerable to the fluctuation of the oil price on the international market.

b) Solar energy for home electricity supply

The electric solar panels are every year more cost-effective in this country totalling 280 days of sun per year. The latest technology integrates electric solar cells in the tiles. As the GoM plans to build new houses in the Safe Islands, it should take efforts to integrate the latest electric solar energy production in their housing construction.

c) Solar energy for hot water supply

It is necessary to implement this technology in any inhabited islands. It represents a strong alternative to the fossil energy to be promoted in inhabited islands and resorts.

[16] State of the Environment, 2004

d) Gas generator

As the government still prioritises the fossil sources for energy production, it is also necessary to look for alternative sources of fossil energy. Gas generator will certainly pollute less, as it will generate less of environment damaging sub-products (carbon dioxide steam and water steam). While carbon dioxide is also a greenhouse effect gas, it is less environmentally harmful than the release of the petrol combustion products.

5.2.10. Land reclamation

Any process of land reclamation should consider the risk for its population facing the loss of natural protecting zones as coral reefs and mangroves.

5.2.11. Institutional development

- The NEAP II should be evaluated according to the relevance, efficiency, effectiveness, impact and sustainability of the many recommendations related to the 10 prioritised sectors.
- There should be a unit within the new MEEW[17] to make the follow up and advice on these recommendations, as well as the ones made in the SoE 2004 (MEC).
- The GoM should adopt the standard ISO 14001 that will ease the preparation and implementation of the many recommended guidelines that are proposed in the 6th NDP, SoE 2004 and NEAP II.
- The Environmental Commission should also monitor environmental regulation and mainstreamed issues. Work plans have to be developed taking into consideration the interdependent nature of the subjects.
- Implementation of NEAP and other environmental policies should be accelerated through development of an implementation plan with responsibilities and actions tied to clearly identified timeframes and resources.
- Specific sectors, which need support, are Environmental accounting, Valuation of the reef, Environmental Database, Polluters Pays Principle.

[17] MEC has been reorganised in the Ministry of Environment, Energy and Water in July 2005

Framework Contract AMS/451 Lot N°6
Request for Services N°2005/102913 – Version 2

Country Environment Profile of Maldives

Final Report - Appendices

August 2005

This project is funded by the European Union

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Appendix 1: MALDIVES' CEP METHODOLOGY

1. OBJECTIVES AND RESULTS

The objective of this assignment is to "identify and assess environmental issues to be considered during the preparation of a Country Strategy Paper". It will provide "clear information on the key environmental challenges and actors, strategies and programmes" related to the Maldives state of environment specific issues mentioned in the TORs. The profile will also establish "key linkages between the environment and the poverty reduction" and "integration of environmental concerns" into the sectors of concentration of the next CSP in Maldives but also make a broad analyze of other sectors aiming to provide available information for the Government of Maldives and the donors' community. Therefore, several sectors will be selected in agreement with the EC to be analyzed. Consequently, this profile could also be an approach of a common consensus of donors about environmental prospects in Maldives.

Results should also include assessments of key environmental issues and trends, environmental policy and legislation, institutional structure and capacity, integration of environmental concerns into the other sectors, involvement of civil society and EC cooperation and international development assistance, and recommendations and priorities. The CEP will be linked to poverty reduction, good governance, access to resources, legal and judiciary reform, trade, tourism, management of natural resources, biodiversity, sanitation, and susceptibility to climate change (Kyoto component).

The consultant will follow the recommendation of the EC environment helpdesk while making the report. To meet the terms of reference of this study, the consultant will undertake the following tasks:

Task 1: Information Collection and Desk Analysis

The consultant will review of previous studies, environmental literature and environmental performance indicators. Among others, the Consultant will base his analysis on available documents he will have access at the beginning of the desk phase.

The consultant will put a lot of attention in understanding the integration of environmental concerns in other areas, like poverty and development, as well as main economic sectors, like tourism, agriculture, fishing, ... He will also make a close analysis of the current physical and biological environment pressures, particularly the raise of the sea level, tsunami prevention, depletion of water resources and clean water supply, and the reallocation of populations.

To this end, a number of sources will be consulted.

The consultant will assess the institutional framework and the roles of national and local authorities aiming to make appropriate recommendation to improve governance related to the environment challenges of the Maldives islands.

The consultant will analyse environmental policy and legislation.

Task 2: Field Phase and Site Visits

The consultant plans to consult the main stakeholders and the line ministries. He will review updated documentation available at field level and discuss the main issues with government representatives

and stakeholders as the CEP should be mainstreamed through sector policy. The analysis should be broad and aimed at a large public audience. It will emphasise the relevance, effectiveness, efficiency, impact and sustainability of the proposed measures.

It should enter into socio-economic circumstances such as reallocation of populations, poverty reduction measures, supply of drinkable water, sewerage collection and treatments but also make an analysis of the donors' environmental projects. Indicators from UNEP/OECD will be reviewed.

Field and site visits will be carried out to key environmental spots, like safe and unsafe islands.

Task 3: Reporting

The reports that will be produced within this project will follow the requirements of the terms of references in terms of deadline, content, language, form and number of copies. A draft report will be produced to the EC delegation of New Delhi prior to the debriefing. The final report will integrate comments of the Government of Maldives and the EC delegation.

In writing the report the consultant will take a particular attention will be given to the integration of environmental issues within other sectors, to the recommendations and to their relative priorities. Particularly the consultant will in:

- Chap 3.2: review the Government policy + weakness
- Chap 4: review the sectors that have an environmental impact
- Chap 4.1 insist on the trends and the problems to be solved according to the specific issues
- Chap 5 Conclusions and Recommendations to the analysis provided and present them in a table form. Priorities will be determined according to relevance, efficiency, effectiveness, impact and sustainability. Natural disaster management and prevention will be a key issue.

Appendix 2: ITINERARY OF THE MISSION

Thursday	23.06	Meetings at EC headquarters, Brussels
Friday	24.06	Meetings at EC headquarters, Brussels
Saturday	25.06	
Sunday	26.06	
Monday	27.06	Travel to New Delhi, India
Tuesday	28.06	Briefing with EC delegation, New Delhi
Wednesday	29.06	Travel to Maldives
Thursday	30.06	Meeting with UNDP
Friday	01.07	Meeting with JICS
Saturday	02.07	Revision of documentation
Sunday	03.07	Meeting with the Ministry of Environment
Monday	04.07	Meeting with the Ministry of Environment
Tuesday	05.07	Meeting with the Ministry of Planning
Wednesday	06.07	Meeting with the Ministry of Planning
Thursday	07.07	Meeting with UNDP
Friday	08.07	
Saturday	09.07	
Sunday	10.07	Revision and documentation
Monday	11.07	Meeting with the Ministry of Environment
Tuesday	12.07	Meeting with UNDP
Wednesday	13.07	Meeting with Ministry of Atolls Development
Thursday	14.07	Field trip
Friday	15.07	
Saturday	16.07	
Sunday	17.07	Writing report
Monday	18.07	Meeting with the Ministry of Environment
Tuesday	19.07	Field trip
Wednesday	20.07	Writing report
Thursday	21.07	Writing report
Friday	22.07	Writing report
Saturday	23.07	Writing report
Sunday	24.07	Writing report
Monday	25.07	Meeting with the Ministry of Environment +Travel to Delhi
Tuesday	26.07	Debriefing at EC delegation
Wednesday	27.07	Travel
Thursday	25.08	Revision of the final report
Friday	26.08	Revision of the final report

Appendix 3: PEOPLE MET (ALPHABETIC ORDER)

Mrs L. AMINAH	Environment specialist	MEWE
Mr. A. AMJAD	Strategic Policy advisor	MEWE
Mrs. E. BATJARGAL	Environmental specialist	UNDP
Mr. E. COYETTE	desk officer	EC DG Environment
Mr. M. FAROOK	Deputy Director General	Ministry of Atolls Development
Mr. M. IMRAD	Planning officer	Ministry of Planning
Mr. G. MARSHALL	Env. Consultant	UNDP
Mr. A. MOHAMED	Director, dev. planning	Ministry of Planning
Mrs. L. MOOSA	Director, Programme	Ministry of Planning
Mr. S. NAGASHIMA	Fishing expert	Japanese Intern. Coop. System
Mr.A.NASSER	Assistant director	Ministry of Foreign Affairs
Mr. H. NIYAAZ	Assistant director general	Ministry of Planning
Mrs. K. PAUL	Co-operation officer	EC delegation in New Delhi
Mr. M. SHAHUDY	Assistant director	Ministry of Foreign Affairs
Mr. SALMINEN	International Envir. Governance and Developing Countries	EC DG Environment
Mrs. G. SCULLY-GOMEZ	Maldives desk officer	EC headquarters/Relex
Mr. D. SWILLENS	Deputy head of section	EC delegation in New Delhi
Mrs. S. YONEZAURA	Procurement coordinator	Japanese Intern. Coop. System

Appendix 4: BIBLIOGRAPHY

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- State of the Environment, Maldives 2004, Ministry of Environment and Construction, 2004
- Tsunami, Impact and Recovery, UN-WB-ADB, February 2005
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Appendix 5: EXPERT'S TERMS OF REFERENCE

TERMS OF REFERENCE

Country Environmental Profiles of Bhutan, Maldives, Nepal and Sri Lanka

1. Background

a) Bhutan

Bhutan is a small, landlocked kingdom in the eastern Himalayas, extending over an area of 46,500 square kilometres. The country is bordered by India and the Tibet region of China. With much of the land being rugged, only two to five percent of land is arable, with the majority of the population of approximately 700,000 living in the river valleys and practising subsistence agriculture and nomadic pastoralism.

Bhutan has cautiously avoided the trend of rapid growth maximisation by taking a unique approach reflected in the frequently cited words of King Jigme Singye Wangchuk: "Gross National Happiness is more important than Gross National Product." Bhutan has set a clear priority on preserving its cultural identity and natural environment, and has sought to encourage popular participation in the development process to reflect people's needs and priorities in the projects, with the government priorities in seeking development with a minimal impact on Bhutan's culture and environment.

Bhutan has always maintained a conservation-based policy concerning its natural assets. Although forests cover 65 to 70 percent of the land and offer vast economic potential through timber export and wood based industries, commercial logging has been banned since 1979. Environmental legislation requires that 60 percent of the country remain under forest.

Bhutan launched its Ninth Five Year Plan (NFYP) on 1 July 2002. The plan emphasises the strengthening of infrastructure, improving the quality of social services, ensuring good governance, promoting growth of the private sector, generation of employment, and preservation and promotion of culture and the environment.

The EC is one of the largest donors in Bhutan. Bhutan perceives the EC's ongoing cooperation as having matured over the years. The European Commission and its Member States have a strong presence in Bhutan and continue to play an important role in Bhutan's socio-economic development. EC assistance has contributed to a stable growth to the Bhutanese economy and has helped Bhutan to be on track in achieving the Millennium Development Goals. The Core sector of Support from the EC to date has been in the Renewable Natural Resources sector, which sustains some 80 per cent of the Bhutanese population, and is the highest contributor to GDP.

The European Commission's (EC) present National Indicative Programme for Bhutan 2002-06 makes available an indicative amount of € 15 million. The highest priority has been given to renewable natural resources with 64% of the budget, and consists of livestock production and integrated pest management. The other assistance areas are health/traditional medicine and trade development and export diversification.

b) Maldives

The Maldives is a chain of Indian Ocean islands spread over a distance of 900 kilometres, and b-cated between northern latitude 4 to slightly south of the equator. The land area, which covers about 26 geographic atolls, is grouped into 20 administrative atolls. The population of the Maldives is about 300,000. The country faces two main geographic challenges: (a) the absence of a significant land mass, which has resulted in a highly dispersed population, and (b) the low altitude of the existing islands. The country has 1,190 islands, of which 198 are inhabited. Of these islands, only 33 have a land area greater than one square kilometre. One third of the inhabited islands have a population of less than 500 and 70 percent of the inhabited islands have a population of less than 1,000. This extremely low population density makes the Maldives unique, even among small island archipelagic states. It also raises the cost of delivering social services and of public administration, as there is hardly any scope to generate economies of scale. The altitude of most of the islands in the Maldives is very low, just above sea level. As a result, rising sea levels cause many islands to disappear. This has rendered some inhabited islands ecologically vulnerable, while other islands have become too densely populated to sustain their communities. The greater Male' area, already home to 70,000 people or almost a quarter of the population, is of specific concern, with increasing strain on social and public services caused by continuing in-migration from other parts of the archipelago.

The principal impact of the tsunami on the Government's development strategy will be to accelerate the process of population concentration. The tsunami lent new urgency to the policy of population concentration, which will go a long way to reduce diseconomies of scale in service provision and will provide protection against sea-level rise. Another impact of the tsunami has been a rethinking of environmental measures needed to defend focus islands—a new plan for creation of safe focus islands has been proposed. The proposed safe island design would involve elevated zones, high buildings, special drainage zones, and sloping revetments for environmental protection. The Government's population consolidation policy rules out forced resettlement. The Government has re-stated its policy against forced resettlement in a recent communication to donors.

c) Nepal

Nepal is a landlocked country in the Eastern Himalaya, bordered by China in the north and India in the east, south and west. It is classified as a least developed country (LDC). The population is estimated at about 24 million, living mostly in rural areas (88%). Nepal's GDP per capita is approximately 230 € in 2003. The country's socio-political situation is dominated by the Maoist's insurgency and King Gyanendra's decision on 1st February 2005 to shelve the democratic process to manage the country and take the "Direct Rule" by chairing himself the government. Social problems and social tensions are increasing as the poor, the Nepali women and the marginalised groups (i.e. Dalits, Kamayas, etc.) continue to face discrimination in various aspects of life.

EC assistance to Nepal dates back to 1977 and totals €200 million. Current aid activities operate within the 1996 EC-Nepal Framework Co-operation Agreement. Development aid has been granted in areas such as irrigation and watershed management, animal health, reproductive health, primary education, institutional capacity building, trade, democracy and human rights.

Environmental changes have been major concerns in Nepal particularly during the last five decades. Although human induced activities such as deforestation, soil erosion and landslides were considered major environmental concerns for the past several decades, impacts of global changes and atmospheric pollution have been realised since the 1980's. Rapidly retreating glaciers in high Himalayas, record of distinctly increasing air temperature at a few locations, and increasing hydrological

extremes are typical burning environment issues facing Nepal. The other major concerns are desertification, sediment deposition, unplanned urbanisation, forest fire, dwindling water resources, loss of biodiversity and needs of alternate energy sources.

Government level policies show that Nepal realised the importance of environmental conservation in development plan only in its fifth five-year plan (1975-1980). Presently, environment assessment is a prerequisite for most development projects. Establishment of a specialised ministry "Ministry of Environment and Population" in 1996 is a major step toward proper monitoring and policy formulation required for environmental conservation for sustainable development. Although a few laws relevant to environmental protection existed in the last fifty years in Nepal, the existing constitution formulated in 1990 first time lucidly stated the need of environmental conservation and biodiversity preservation.

Tackling the challenge of environmental degradation is an urgent need in Nepal. Main areas of activities include the enforcement of the environmental laws that have already been enacted and the relocation of polluting industries. Development of skilled labour to carry out these activities represents a sector where the Commission can play a lead role through the implementation of the CSP/NIP 2007-2013.

d) Sri Lanka

The Democratic Socialist Republic of Sri Lanka is an island in the Indian Ocean, south of the Indian subcontinent.

The conflict waged by Tamil separatists in the northern and eastern regions of Sri Lanka since 1983 experienced a break with a cease-fire on the 22 February 2002. The donors support meeting on humanitarian aid, held in Oslo in November 2002 consolidated steps towards peace, with the donor conference in Tokyo in June 2003 resulting in pledges amounting to € 4,5 billion.

The tsunami that hit the countries around the Indian Ocean on December 26, 2004 was one of the worst natural disasters in recorded history. After Indonesia, Sri Lanka has suffered the most from the tsunami. The tsunami has destroyed or damaged: 130,000 houses, 168 public schools, four universities, 18 vocational centres; 92 local clinics, hospitals and drug stores; significant losses in power, transportation (roads and railways), water supply and sanitation. Sri Lanka's tourism industry has been very hard hit since the disaster occurred during one of their busiest periods of the year destroying key infrastructure. Environmental damage has also been significant[18]

On the basis of the CSP, the 2006 NIP will focus on two components: i) support to the peace process, through the resettlement of Internally Displaced Persons (IDPs) and improving good governance in the North and East and ii) economic co-operation and trade-related technical assistance. The programming mission for the next NIP 2007-2012 will take place early June 2005. The E.C. is interested in taking stock of the present situation and integrating Environment as a crosscutting issue for all future reconstruction programmes.

18 UN has included US$3 million in its Flash Appeal for short and medium term measures for assessment and recovery of natural resources and livelihoods.

2. Objective

The main objective of a Country Environmental Profile is to identify and assess environmental issues to be considered during the preparation of a Country Strategy Paper, which will directly or indirectly influence EC cooperation activities.

The Country Environmental Profile will provide decision-makers in the partner country and in the European Commission with clear information on the key environmental challenges, as well as policies, strategies and programmes designed to address them. This information will ensure that the EC cooperation strategies systematically integrate environmental considerations into the selection of priority focal areas and establish the necessary environment safeguards for all cooperation activities undertaken in the Country.

The Profile will establish the key linkages between the environment and poverty reduction. It will constitute an important source of baseline information and contribute to focusing political dialogue and cooperation with the Country on key areas of concern such as sustainable development as well as raising awareness among policy-makers.

3. Results

The assessment will deliver the following results:

- An assessment of the environment identifying key environmental factors influencing the Country's development and the responses to these.
- An assessment of national environmental policy and legislation; institutional structures and capacity, and the involvement of civil society in environmental issues.
- An assessment of past and anticipated future tends of environmental indicators.
- An overview of past and ongoing international cooperation in the environment sector.
- Recommendations and, as far as possible, guidelines or criteria for mainstreaming environmental concerns in priority development areas. These recommendations should support the preparation of the Country Strategy Paper and, as far as possible, include guidelines or criteria to be used for environmental mainstreaming in subsequent phases of the operation cycle.

4. Issues to be assessed

The consultants will assess the following issues:

4.1. The state of the environment

This chapter should identify key issues, including facts (pressures, current status and trends) and problems in the following areas:

- Physical environment: air and climate, land, water, and natural disaster risks.
- Biological environment: biodiversity, ecosystems, biological resources of cultural, social, or economic importance.
- The social and economical causes of the environmental situation and trends and their consequences on human well-being and sustainable development should be presented too.

a) Bhutan

Specific issues to be addressed include:

- It should be examined how environmental conservation has been integrated into Bhutan's development policy; what the impact of this has been, as per the mid term review of the 9th Five year Plan, and how it will be addressed in the 10th Five Year Plan, within the context of the socio-economic impact of migration, urbanisation etc.
- The environmental impact of an increasing focus on resource extraction industries such as, mining (as these activities are energy intensive).
- Role of hydroelectric power in biodiversity conservation.
- Assessment of de-forestation/re-forestation targets (cutting and planting of forests).
- The impact on the environment following the emphasis on promoting economic self-reliance, (92 percent of the population is engaged in the agricultural sector with agricultural exports being seen to be an option to generate foreign currency revenue while at the same time working to enhance rural revenue and improve the standard of living). The Bhutanese government in recent years has been encouraging production of cash crops such as apples, oranges, potatoes and cardamom, aimed at neighbouring markets such as India and Bangladesh.

b) Maldives

Specific issues to be addressed include:

- Environmental Impact of the Safe Islands Policy.
- Improving governance: improvements in institutional capacity in environmental monitoring and enforcement. Reform the provision of environmental infrastructure to meet the challenges of delivery mechanisms and develop a good public accounting system.
- The environmental impact of population concentration and reconstruction, following the government's development policy post tsunami (UNEP report February 2005)
- The increasing stress on the environment due to larger volumes of untreated sewerage and solid waste disposal.
- Depletion of water resources and lack of clean water supply.
- Strengthening of Atoll administrations as well as Island communities facilitating effective decentralised management of natural Resources.

c) Nepal

Specific issues to be addressed include:

- Environmental degradation in urban and peri-urban areas has become a matter of serious public concern, particularly in the Kathmandu Valley. Its population, estimated at 1.5 million people, is growing at an annual rate of about 10%. Existing infrastructure facilities are unable to cope with such a rise. The high use of harmful chemicals, the lack of solid wastes facilities and increasing fuel emissions following mass imports of and plying of old vehicles are a growing danger to public health. An appraisal of the current trends and policy options has to be examined.
- In the mid-1990s, the liberalisation of industrial policy led to the haphazard establishment of industries in urban areas, with few health and environmental safety measures taken. A critical review of the policy with impact assessment is needed.
- An assessment of skilled labour and capacity building required to tackle these issues.

d) Sri Lanka

Specific issues to be addressed include:

- How the accelerated rebuilding programme will take into account the environmental impacts of reconstruction interventions, in a situation where there was severe stress on natural resources, even prior to the environmental destruction caused due to the Tsunami. With the support of UNEP, the Government has commissioned two teams of national experts to produce Brown and Green Environment studies to assess the extent of damages caused by the tsunami (to be published end May 2005). The report will provide a series of recommendations, notably with regards to coastal regeneration and housing policy.
- An assessment of the pollution due to the haphazard solid waste and sewer disposal, excessive extraction of sand in the rivers, destruction caused to sand dunes, coral mining in the coastal areas, removal of mangrove forests which were key environmental issues prior to the Tsunami. These issues should be revisited post Tsunami.
- Reference should be made to local and internationally recognised environmental indicators and quality standards to establish a consistent basis for comparison of environmental and sustainable development performance. The indicators selected should facilitate future monitoring and evaluation of the extent of environmental integration and be useful for future environmental assessments. Attention should be paid to the rate of change of indicators where information is available.
- If appropriate, the information could be organised according to eco-geographical subdivisions with the scale (regional, national, local) of the issues indicated.

4.2. Environmental policy and legislation

A brief description and a review of strengths and weaknesses of the following:

- National policies, environmental strategies and action plans (including, if possible according to the results of 4.1, an assessment of the environmental performance in meeting the objectives and targets).
- Legislation, current and in preparation, by the National Institutions covering development control, requirements for environmental assessments, sustainable use or conservation of natural resources, pollution control, land tenure and land reform. The effectiveness of legislation enforcement. The provision for public participation in environmental issues, procedures for public participation in development control and environmental planning and public access to environmental information.
- National approaches to key international or regional environmental conventions such as those concerning climate change, biodiversity and desertification.

4.3. Environmental institutional framework

- The Institutional structures and responsibilities of the authorities dealing with environmental issues in policymaking, legislation, planning, environmental protection, monitoring and enforcement.
- The level of co-ordination between sectoral institutions or ministries involved in environmental or natural resources management issues.
- The major NGOs, institutes or other institutional stakeholders.
- The capacity and financial resources of authorities responsible for environmental management.
- The extent and quality of protected areas (and, if relevant, other land use measures).

4.4. Integration of environmental concerns into the main sectors

The assessment should examine the integration of environmental concerns in the main sectors that have key linkages with environmental issues and might be identified for EC support. Following the country specific issues, further sectors may emerge during the mission, which can be identified for EC support.

4.5. EU cooperation with the Country from an environmental perspective

This should cover experience relating to interventions with specific environmental objectives as well as the integration of environment into other sectors, including the application of environmental assessment procedures. Where information is available the environmental impacts of EU cooperation or potential risks should be identified for the benefit of future programmes. The results of existing evaluations/reviews should be incorporated and lessons should be drawn for the future.

4.6. Cooperation funded by other agencies from an environmental perspective

This should cover involvement of other funding agencies and their experience in the Country and include a list of recent and planned projects/programmes, with an environmental focus or anticipated impact.

5. Conclusions and recommendations

The key aspects of the state and trends of the environment in the Country including policy and institutional constraints and challenges should be clearly stated. This may be presented in a matrix, crossing environmental concerns and the main sectors or policies.

Based on a comprehensive assessment of available information and consultation with stakeholders recommendations on how best to address environmental issues should be elaborated. Individual recommendations should be clearly articulated and linked to the problems to be solved and grouped according to the involved sector or institutional stakeholder. Recommendations should be easily used in the preparation of the Country Strategy Paper, taking into account the existing Country Strategy Papers (which will provide general guidance on the style and detail required) and already pre-identified options for the next CSP. Nevertheless, useful recommendations can also be made for the Government, other donors (particularly EU Member States) and the use of EC horizontal budget lines.

The relative priority of the recommendations and an indication of the challenges to their implementation should be given.

Recommendations are likely to cover direct environmental interventions as well as the provision of environmental safeguards for other activities.

Recommendations should also be made as to how best the Commission and the Government can mainstream environmental issues into the next cycle of country strategy papers. Guidance should be given regarding Strategic Environmental Assessment in major sectors and performance indicators if budgetary supports are foreseen.

The constraints to preparing the profile caused by limited information should be described, and an evaluation of the need for additional studies, such as Strategic Environment Assessments or others, should be made.

6. Work plan

The work plan should include but not necessarily be limited to the following activities:

- Consultation with EC country desk officers and other relevant officials, EC Delegation in the Country, a selection of national and local authorities, key international funding agencies operating in the Country, plus key national, international civil society actors operating in the environmental field.
- Review of previous Country Environmental Profiles and Country Strategy Papers; evaluation reports with respect to environmental issues on development and economic co-operation produced by government, EC or other agency sources.
- Review of environmental literature, evaluation reports, environmental policy and legislation framework, legislation and regulations and enforcement relating to environmental issues, action plans, and progress in implementation.
- Review of environmental performance indicators selecting appropriate indicators from those suggested by organisations such as EEA/OECD/Eurostat.
- On the basis of the proposed work plan and time schedule outlined in these Terms of Reference, the consultants should provide a detailed work plan in their offer.

7. Expertise required

Four (4) Category I (EU Nationals) Environmental Experts (one per country), who should have the following profile:

- Expert level I with at least 15 years wide experience in environmental issues, including institutional aspects; international environmental policies and management; environmental assessment techniques and experience in rapidly assembling, assessing information and developing recommendations.
- A capacity for rapidly assembling and assessing information and developing recommendations is called for.
- Previous working experience in the region would be preferred.
- An understanding of EU environment and development policies is required, and experience in the preparation of environment development programmes would be an asset.

In addition:-

- Experts should have an understanding of the EU environment and development policies;
- Experience in undertaking environmental analysis and preparation of development programmes would be an asset;
- Familiarity with Commission guidance on programming, country strategies, PCM, policy mix and integration of environmental issues into other policy areas is desirable;
- Experience of participatory planning processes would be an advantage;
- The experts should have excellent skills in English as the final report must be presented in English.

For each specialist proposed, curriculum vitae must be provided of no more than four pages setting out the relevant qualifications and experience.

8. Reporting

The study conclusions must be presented in the Country Environmental Profile report in the format given in Appendix 1.

One draft report per country in (5) hard copies, and one in electronic format (pdf or word format) are to be presented to the EC Delegation in New Delhi, India, and a supplementary copy of the CEP Nepal and Sri Lanka to respectively the EC Delegation in Nepal and in Sri Lanka. Within three weeks, comments on the draft report will be received from the EC Delegation New Delhi, India.

The consultants will take account of these comments in preparing the final report (maximum 40 pages excluding appendices). A final report (one per country) in English (10) hard copies and one in electronic format (pdf or word format) is to be submitted to the EC Delegation in New Delhi, India, and a supplementary copy of the CEP Nepal and Sri Lanka to respectively the EC Delegation in Nepal and in Sri Lanka.

9. Presentation of the offer

The consulting firms should present their offer by providing the CVs of the experts (not more than 4 pages each), and the proposed methodology (not more than 4 pages).

10. Time schedule

Indicative start date of the activities: Mid June 2005
Indicative end date of activities: Mid August 2005

	Expert I Category 1 Bhutan	Expert 2 Category 1 Maldives	Expert 3 Category 1 Nepal	Expert 4 Category 1 Sri Lanka
Desk analysis. Meeting with country desk officers in Brussels	5	5	5	5
Briefing in EC Delegation New Delhi, India – including travel	2	2		
Briefing in EC Delegation Sri Lanka, Nepal			2	2
Field phase including travel	15	15	15	15
Draft Report	3	3	3	3
Debriefing in EC Delegation New Delhi, India – including travel	2	2		
Debriefing in EC Delegation Sri Lanka, Nepal-including travel			2	2
Final report	2	2	2	2
Total days	29	29	29	29

11. Appendices

I. Report format for a Country Environmental Profile

Standard Report Format

Report Format for a Country Environmental Profile

Maximum length (excluding appendices) 40 pages.

The following text appears on the inside front cover of the report: "*This report is financed by the European Commission and is presented by [name of consultant] for the … (National Institution)*

and the European Commission. It does not necessarily reflect the opinion of the … or the European Commission.

1. Summary

This is an executive summary of the key chapters of the Country Environmental Profile clearly indicating priority challenges and areas for action at the country level.

2. State of the environment

This chapter will also set out an assessment of the state and trends of the environment as outlined in Section 4.1 of the TOR.

3. Environmental policy, legislative and institutional framework

This chapter will provide an assessment of the Country's environmental policy, regulatory and institutional framework for pollution control, natural resource use and sustainable development. It will be divided into sections as follows:

3.1. Environmental policy and legislation

This chapter must include an assessment of the key issues outlined in Section 4.2 of the TOR.

3.2. Environmental institutional framework

This chapter should review the roles and capabilities of the main national institutions as outlined in Section 4.3 of the TOR.

3.3. Integration of environmental concerns into the main sectors

This section must include an assessment of the key issues as outlined in Section 4.4 of the TOR.

4. EU and other donor cooperation with the Country from an environmental perspective

This section must include EC and other donor assistance within the Country from an environmental perspective covering the issues outlined in Sections 4.5 and 4.6 of the TOR.

5. Conclusions and recommendations

This chapter will present the conclusions on the state and trends of the environment in the Country, including a summary of the key environmental issues in a table form. Recommendations will be made for major stakeholders (including the Government, the Commission and other donors) with a particular emphasis on how best the Commission can mainstream environmental issues into the new country strategy paper.

6. Technical appendices

I. Environmental maps of the Country

II. Reference list of environmental policy documents, statements and action plans, and other relevant technical information.

7. Administrative appendices

I. Study methodology/work plan (1–2 pages)

II. Consultants' Itinerary (1–2 pages)

III. List of persons/organisations consulted with their affiliation and contact details (1–2 pages)

IV. List of documentation consulted (1–2 pages)

V. Curricula vitae of the consultants (1 page per person)

VI. Terms of Reference for the Country Environmental Profile.